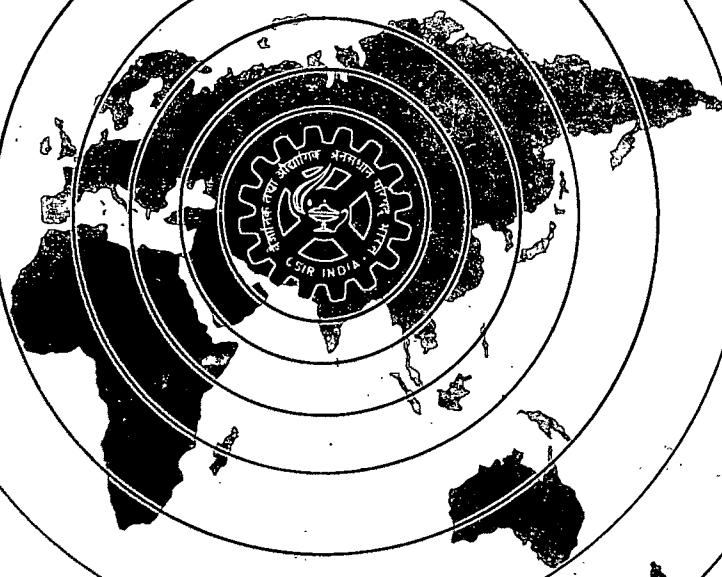


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ROLE OF MULTIMEDIA/HYPERMEDIA (MM/HM) IN BIOMEDICAL INFORMATION SERVICES IN INDIA

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Basic concepts of Multimedia (MM) – it's historical development and components are described. The need, importance, advantages and disadvantages in information storage and retrieval with particular reference to biomedical information services are discussed. The hardware and software requirements for MM work station have been suggested. The existing MM product companies and the use of MM and its products in the field of biomedicine viz., cardiology, diabetes, hyperoncology, pediatric neuro-surgery, etc. are highlighted. Some basic problems in it's implementation have also been discussed.

INTRODUCTION

In the present world of expanding communication facilities, information is an extremely important commodity. The key role for information centres and libraries (LIC) in education and research demands that they must harness information technology (IT) to encourage the library users to make better use of traditional information resources and to develop new methods of access to information through varieties of services for attracting a wide range of users. Librarians are in a position to meet the challenges, and provide the information resources to the users with the help of ITs without any fear, frustration and failure. Multi-media (MM) is no longer a futuristic technology which is, not only available now but also, affordable. The kind of results till now a dream could be achieved through MM from point of information sale to market presentation, research, training, publishing, audio, video, audio-video production for information storage and retrieval (ISR). A MM is a unique development, both for library staff and the users.

With the convergence of computer and communication technologies and emergence of multimedia, integrating text, voice and video processing,

an explosive synergy has materialised, giving birth to a series of products for a paperless office environment. MM computer-communication is now poised to become a multi-billion dollar industry by the turn of this century. By increasing multi-sensory response and improving the involvement of people concerned, the information retention is greatly enhanced by the application of MM technology. At present, more than 20 organizations, institutions, universities in the country are working full time in developing such systems, through which one can develop courseware from kindergarten to advanced research. Therefore, some of the library and information centres have already started using it as a more flexible tool for ISR which is rather a new area and has become the hottest buzzword in the IT industry today. The availability of high performance computers at affordable prices and the resulting movement of the Personal Computers (PC) industry from the character based interfaces to the graphical users interfaces has led to the rapid growth of MM application. It has become a very popular term in information systems today, and biomedical ISR is no exception to it. The development in the area has just started, but it is hoped that the products like, text books, videos, news papers, etc. using MM will be available within a short period.

WHAT IS MULTI-MEDIA?

The term 'Multi-media' (MM) means different things to different people. There are two schools of thought about the MM. Some people say MM is nothing but a hot air. Why would any one want to invest in MM? Others say no one should be without MM. Quite literally, it refers to anything that uses more than one media to present information. Unimedia e.g. musical recording uses only media i.e., sound, whereas a television is a type of MM because it communicates using sound and video. One way of defining MM

is to list common technical characteristics of the systems claimed to be MM systems. This could be referred to as a technological definition. Example of such technical characteristics are multi-dimensional presentation techniques, multimodal interaction techniques, hypermedia (HM) or hypertext (HT) techniques that enable the users to explore the information actively and with broad band communication techniques supporting cooperation between users.

The term 'Multimedia' is formed by the combination of two words – Multi and Medium. Multi refers to many i.e. at least two. Media is the plural form of medium [1]. Medium can refer to storage, transmission, communication, representation, presentation, input interaction and perception, meaning that it can refer to different levels of abstraction. It also refers to a basic information type like text, graphics, image, video or audio. MM can be defined as, an integration of several media (i.e. text, audio, visual, graphics, animatory (TA VGA), etc. on a single medium in the same information unit) (Fig. 1). Some of the commonly available MM products are video disks, video tapes, TV, etc.

Because of the importance of the area of ISR, many vendors are trying to put the label MM on their systems because they feel that most people understand and will be a part of future ISR and computer system. When one examines the facilities offered, it might be questionable whether the systems are really MM systems. The word has been misused and made it difficult for people for precise comprehension. Thus, there is a need to find a precise definition of MM that is generally agreed upon among researchers and practitioners in the field. To give a background to the question of definition, a definition that was given at the UIMS Workshop, Portugal, June 1990 is quoted below :

- a) Multi-media is concerned with both input and output (including their combination called interaction).
- b) For output, multi-media is concerned with multiple streams operating in parallel (for example, vector graphics, raster graphics, text, video, sound, etc.). Stream may not be the best word – channel, tracks or modes are alternatives.
- c) For input, multi-media is concerned with simultaneous input events generated by one or several different devices (for example, key

cards, foot pedals spoken commands, dataglove, datasuite, five finger mouse, touch screen, eye tracker musical instruments, etc.), all being used parallel.

- d) On input, it is concerned with the composition of higher level input tokens in term of primitive events. For example, gesture input could be derived from a set of dataglove positions.

The word 'Hypertext' (HT) was coined by Nelson in 1965 and many other words and new concepts related to this field were used. It seems that Bush was the originator, Engelbert, the developer, and Nelson disseminated the idea to the world. Nelson defined HT as "the combination of natural language text with the computer capacities for interactive branching or dynamic display - of a non-linear text - which cannot be printed conveniently on a conventional page [25]". This leads to the modern definition of HT as "A large number of information/fragments/chunks (such as text, graphics and images) linked together electronically forming a multi-faceted indefinite shaped database in which one can write and read the information non-sequential and non-linearly" [25]. As explained in a recent article, a HT system allows users to link information together, thereby, creating trails through associated materials. Hypermedia (HM) is similar to hypertext, but instead of linking just text, user can link to other media such as graphics, video, spread sheets, animations and voice in the computer. In other words, the difference between HT and HM is that an HT system allows authors to link together only textual information blocks, whereas an HM/MM system provides linking capabilities between heterogeneous blocks of information generated with multi applications. MM is simply an extension of HT with which authors can create a linked corpus of materials that includes text, static graphics, animated graphics, video sound, music, etc. The term HT generally describes "a medium wherein the reader can study a particular document and coming upon a word or phrases that he/she does not understand, opens a second document that provides some text. The newly opened document can be further exploded in the same way". MM involves a concept and the total interaction between the user and related piece of information via a single channel goes under the generic name "multimedia". MM/HM is a method of using computerisation to improve access to a range of information carriers.

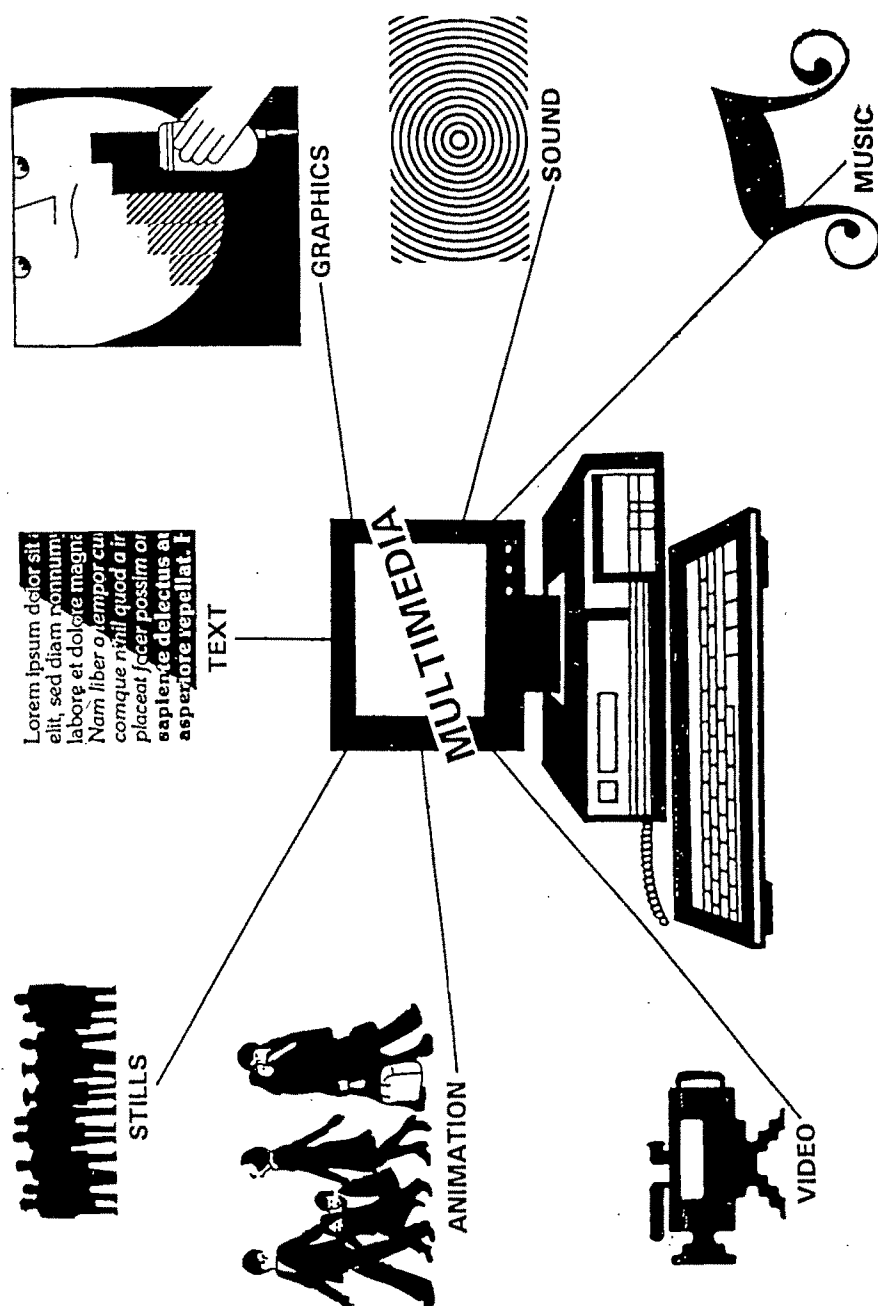


Fig. 1 : Multimedia

In the computer world, MM refers to software programmes that use more than one method of communicating information to the users-such as, TA VGA and/or combination of all. Technically, MM on the PC is not as new as many may think. The integration of text with graphics has been in use in many software applications for years. Any software that uses graphics images (such as, charts and maps) to illustrate the text information displayed on the computer screen is an example of this. However, more recently MM has come to mean more than the integration of text and simple graphics. It now encompasses sound and moving graphic images (animation)also. Using this technology on an ordinary PC, it is possible to view simultaneously to windows containing text, still graphic image, while listening to an explanation of what are being seen on the screen. MM, thus, enhances the learning experience by involving more of our senses.

How MM can be useful for teaching/training/research in the field of biomedicine can be illustrated with an example. A program designed to teach about a heart - on the computer screen, one window with text will explain how it looks like (i.e. anatomy), another window shows physiology

of heart indication of how it functions, and third window may show a person operating a heart patient for by-pass surgery. Mean while a graph, a voice explains to look for in the video. It simultaneously uses four methods to reach a particular decision i.e. text, graphics, animation and sound. It would still be MM if it just used text and graphics or text and sound or text/graph and sound, but full MM application can incorporate much more.

Though views on exact definition differ, but the underlying idea is that a MM system is one that *seamlessly integrates text, numerics, pictures, video, animations and sound within a single digital information environment.*

HISTORICAL DEVELOPMENTS

In the context of MM, it is important to emphasize that the MM approach is based on the new visions about the usage of the computers. It all started with the vision of Dr. Vannevar Bush in 1945, reporting in his famous article "As we may think", where he described a new kind of computer tool, that should enable the user to link documents, notes, drawings, text sketches, photographs, etc. according to their needs - imple-

Table 1

Overview of history of MM/HT/HM*

Year	Development
1945	Vannevar Bush proposes Memex
1965	Ted Nelson coins the word "Hypertext"
1967	The Hypertext Editing System at FRESSBrown University, Andy Van Dam etal
1968	Doug Engelbart demo of NLS system at FJCC
1975	ZOG (now KMS): CMU
1978	Aspen Movie Map, first hypermedia Videodisk. Andy Lippman, MIT Architecture Machine Group
1984	Filevision from Telos : limited hypermedia database widely available for the Macintosh
1985	Symbolic Document Examiner, Janet Walker
1985	Intermedia, Brown University, Norman Meyrowitz
1986	OWL introduces Guide, first widely available hypertext
1987	Apple introduces Hyper Card, Bill Atkinson
1987	Hypertext '87 Workshop, North Carolina
1989	Hypermedia '89, Taylor Graham
1992	Multimedia Computer and Communication (INFOCOM'92, Bombay, India), N. Sheshagiri and Aram Akapov

*Modified and updated version of the original table given in Nelson, Jacob [22].

mented by Doug Engelbart, 15 years later in order to provide a set of tools for extending the human intellect. His goal was to design tools that enhance the capabilities of the users using them, rather than develop systems replacing a limited intellect. The next milestones in this development were Theodor H. Nelson's vision about global HT library 1965 (that partly have been realized) and Bills Atkinson's vision about HT capabilities for the ordinary user, realised in the form of Hypercard™, Supercard™ and similar products.

It can be concluded that MM/HM/HT was conceived in 1945, born in the 1960's, and slowly nurtured in 1970s and finally entered in the real world in 1980s with it's rapid growth in 1985, culminating in a fully established field during 1989. Now, several real-world systems are available, that anybody can buy and store in their local computers.

COMPONENTS OF MM

Usually there are five components in MM software, the four of which are text, graphics, animation and sound, the fifth component being, interactive links that integrate the whole program by giving the user a way to interact with the program and cause things to happen [2]. An exposition of these components is detailed below.

Text

Text is mostly available in printed documents in different forms viz., full text, bibliographical indexes, etc. Text is the basis for word processing programs and is the fundamental information used in most of the MM programs. In fact, MM packages often involve the conversion of book (full text) to computerised form, allowing the user to look up information quickly (without constantly referring to an index or table of contents).

Graphic Images

Graphic images generally mean a "still" image viz., photographs, online drawing, or graphs (bar, linear, circular, etc.) and play an important role in the presentation of data of any R&D work. For any human being, visually oriented materials and pictures are a powerful means to illustrate information whether on a piece of paper or on the computer screen. Graphic images are, therefore,

an important component of MM. A hospital's database of patients with names, addresses, and other information is much more effective if the photographs of those patients (including X-rays, anatomical structure of disease, etc.) can be displayed. Graphic files are always larger and occupy more storage space in computer than the text files. This is one of the reasons why MM applications require hard disk drive or equivalent storage capabilities, such as CD-ROM.

Animations

Like graphic images, animations refer to a moving picture or videos, and are also powerful communicators for example, movement of heart beating in different conditions i.e. normal and/or during infection/different physiological disturbances. These animations are even more powerful and useful for illustrating concepts that involve movement. The other examples might be the movement of different animals in different conditions and even behaviour of same animal during different meteorological conditions e.g. animals behaviour during earthquake, different seasons, etc. These concepts are difficult to illustrate using a single photograph or even a series of photographs, and even more difficult to explain using text and helps in varieties of decisions. Animation files require much more storage space than graphic files involving a single image. This often necessitates the use of a CD-ROM drive.

Sound

Sound can substantially reinforce our understanding of information presented in other ways. Inclusion of sound in MM program serves as a more powerful and useful tool to provide information to users which otherwise is not possible using any other method. For example, a narration describing what are seen in a video of a bird's flying and gliding, a horse's gallop and a horse's walk can further enhance our understanding of the difference of above actions with the help of sound. Although the same information could be conveyed using a text, it is difficult to read explanatory text simultaneously with watching a video. It is nearly impossible to provide an accurate description of a lion's roar, or a bird's call or heart beat/lung sound (normal as well as abnormal/infectious condition) using words and images.

Interactive Links

Interactive nature is an integral part of MM. This means that the user can point with a mouse and click on certain screen "objects" such as, button or highlighted text and cause the programme to respond in a certain way. For example, a paragraph of a text may explain how to use the medical terminology/special terminology (Mesh), that are unfamiliar to the user. By pointing and clicking on these words, the user may bring up a window with additional information explaining the words. A "button" is a screen object with a label that indicates what action needs to be activated. For example, the user may click a "Pause" or "Play" button to control the animation display. Or there may be button indicating "Sound" that when clicked on causes the program to play a recording of lung's or a heart's sound in normal and also in different infectious conditions. With this feature, moving the mouse pointer over a word or illustration that has an additional information, may open up explanatory window automatically without the need to click on the mouse button.

These interactive links, together with the information they connect, are often referred to as HM. There are some more specific terms viz. hypertext (=hot word), hypergraphics and hypersound, indicating what type of information is linked. For instance, hypertext allows the users to bring up explanatory text, whereas hyper graphics display a graphics image. It is the interactive nature of the MM that takes care of every thing to provide information to users.

REQUIREMENTS FOR MM WORKSTATIONS

The first requirement for developing MM applications is that it should be affordable. There are a number of users in the field of biomedicine, who would like to use MM based products in their day to day work if it is a commercially viable proposition. They need a system by which different audio/video material can be integrated with computer according to their specific requirements. A general hardware and software requirements may be

-600

Hardware (C.P.U.)

PC-286 or 386 Processor at least 4 MB RAM (8 MB is preferable)
VAG graphics
Digital Audio System
HD 80 MB (120 MB is preferable)
VHS-VCR controller card (8 bits is acceptable, but 16 is preferable)
A CD-ROM drive (at least 150 K per second transfer rate)
Audio-Amplifier/speaker
Any model right from PC-286 to PC-386 can be shown as per requirements. It is not essential to have CD-ROM drive, video card, etc., but these may also be added if application demands.

Software

Authoring Software (e.g. Windows, Linkway, Authorware, Professional)
Micro Minicard, etc.

APPLICATIONS OF MM IN LICs

MM applications involve integration of various media of information in its natural form. These systems deal with information as it exists in physical systems. Basic mechanism for perceiving a physical system for human beings is the audio-visual media. Worldwide efforts have been made for quite sometime to integrate audio and video on a single platform. Scientific research is also going on digitizing the real time video, compressing it in real time and storing it onto hard disk.

The key role of LICs in education and research demands that they must harness IT to encourage the readers themselves to make better use of traditional resources. Also, new methods of access to information services are needed to attract a wider groups of users. A new age and a new way of providing services to our users has dawned with the creation of MM [3]. It can be built in varieties of applications from school to corporate presentation of museum. The few applications in biomedicine are : education, research, training, creation of databases, exhibitions, etc. (Figure 2).

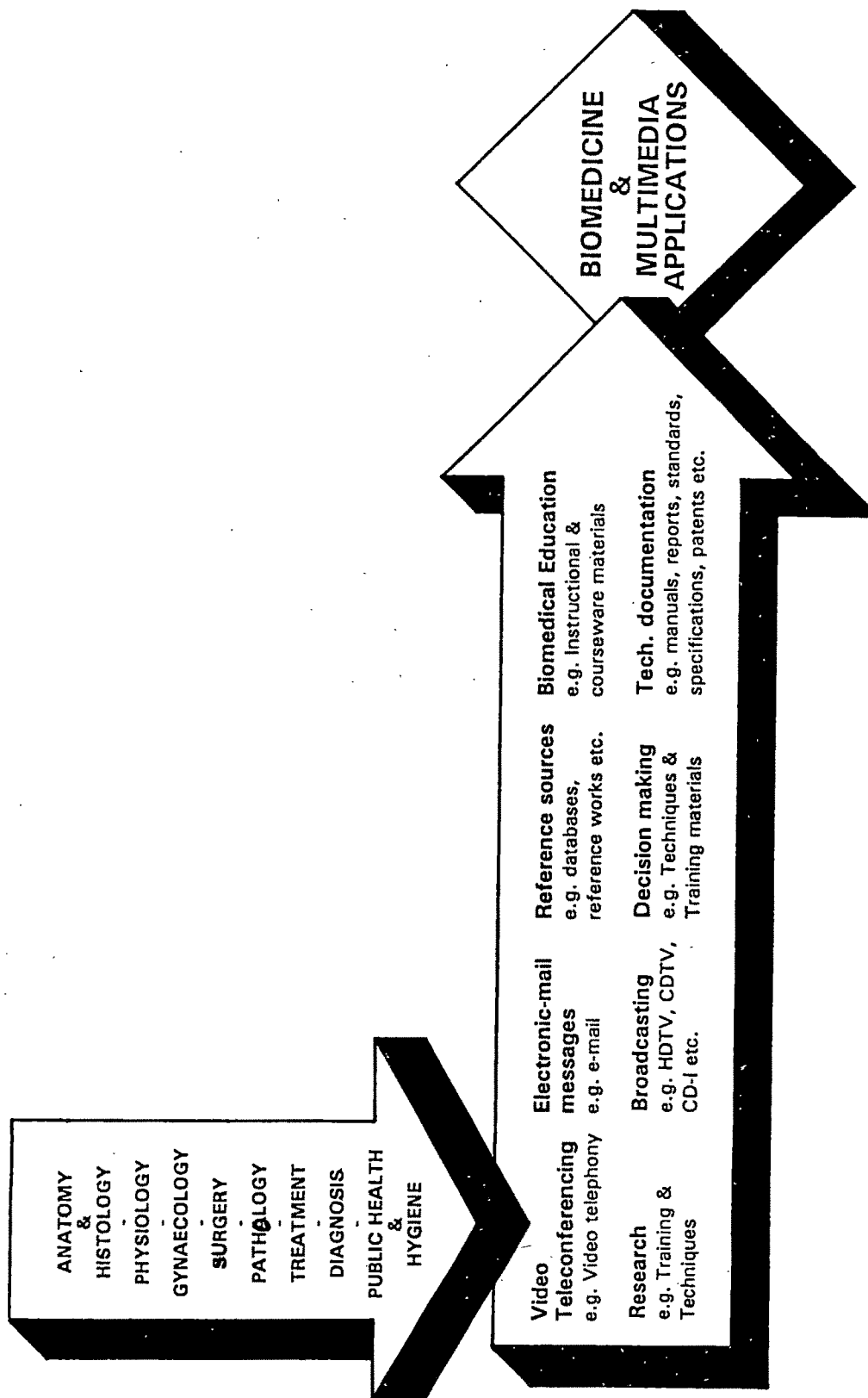


Fig. 2 : Multimedia application in biomedicine

Representation of Information

MM is aimed at meeting the demand for better access and presentation of information using multidimensional approach of representation. The usefulness of MM lies in its ability to present rapidly a variety and quality of information to meet the needs of different types of users. There are a number of users in the field of science and technology, training, corporate and business organization who would like to use MM based products in their day to day work, if it is affordable. Physicians, doctors, scientists are likely to use MM extensively by integrating different audio/video material with computer according to their extensive requirements. Following are the areas where MM

can be used, effectively and efficiently in India – a) School, b) Research & Education, c) Training, d) Creation of MM databases, e) Science Centres and Art Galleries (Exhibitions), f) Museums, g) Corporate Presentations, h) Simulation, i) Tourism, j) Biomedicine/Health Care etc. The system is useful whenever images, sound and applications need to be stored or displayed in non-sequential manner. For example, in the field of biomedicine, a non-linear Human Anatomy atlas can be created by distinguished illustrations from books, adding text, voices, animations and menus. Using this, a viewer can select a part of body and proceed more progressively deeper into the anatomical structure of that region (Fig. 3a, b, c, d).

Ten Basic Systems:

Cardiovascular
Digestive
Endocrine
Excretory
Lymphvascular
Muscular
Nervous
Reproductive
Respiratory
Skeletal

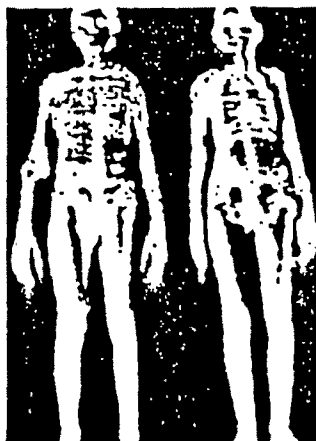


**Fig. 3 (a) : Sequence of images from the anatomy example
(The user clicks on the word "Cardiovascular")**

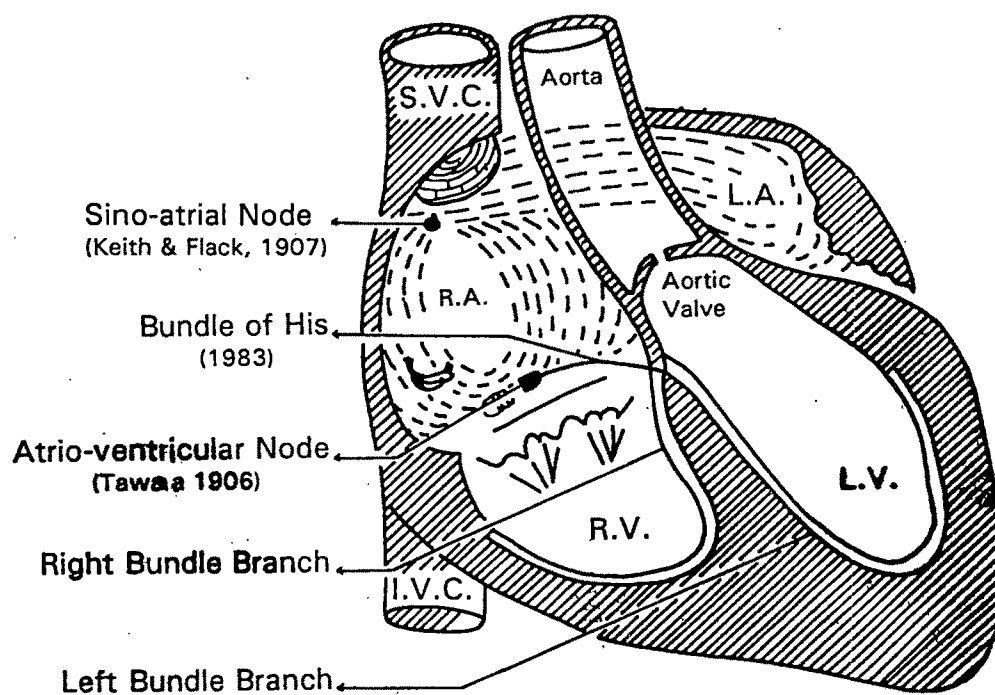


Fig. 3 (b) : Anatomy of the conducting system

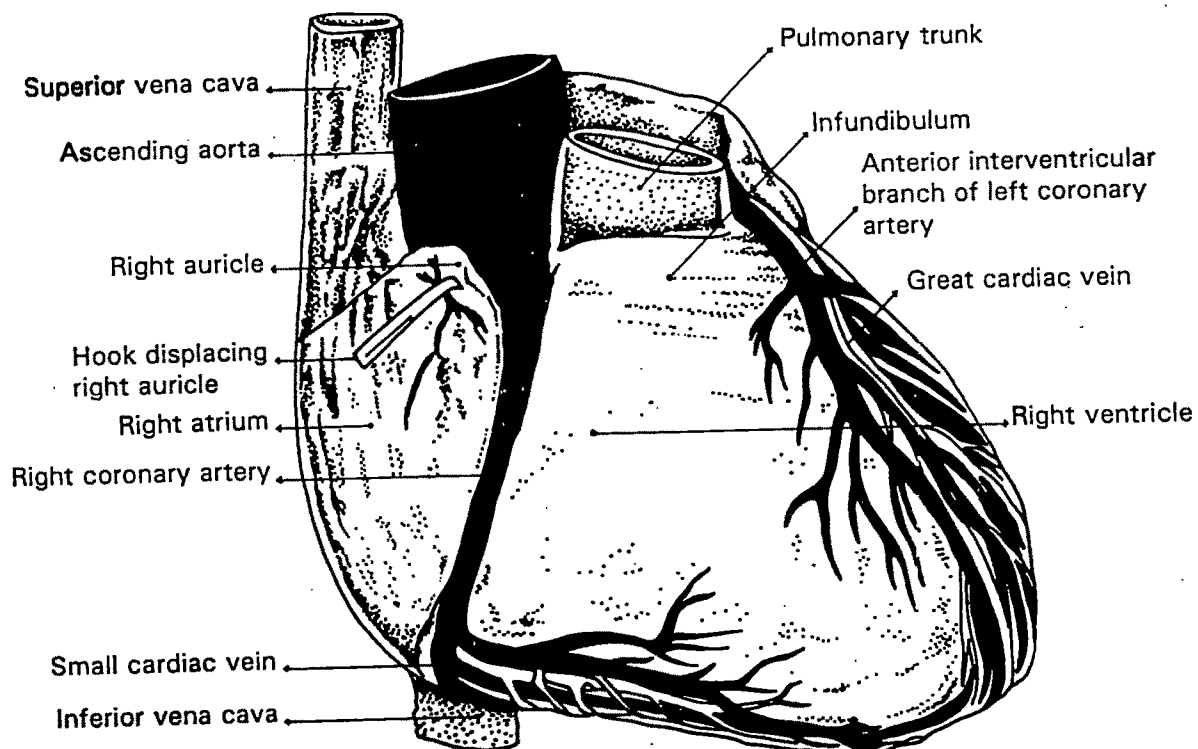


Fig. 3 (c) : The interior or sternocostal surface of the heart

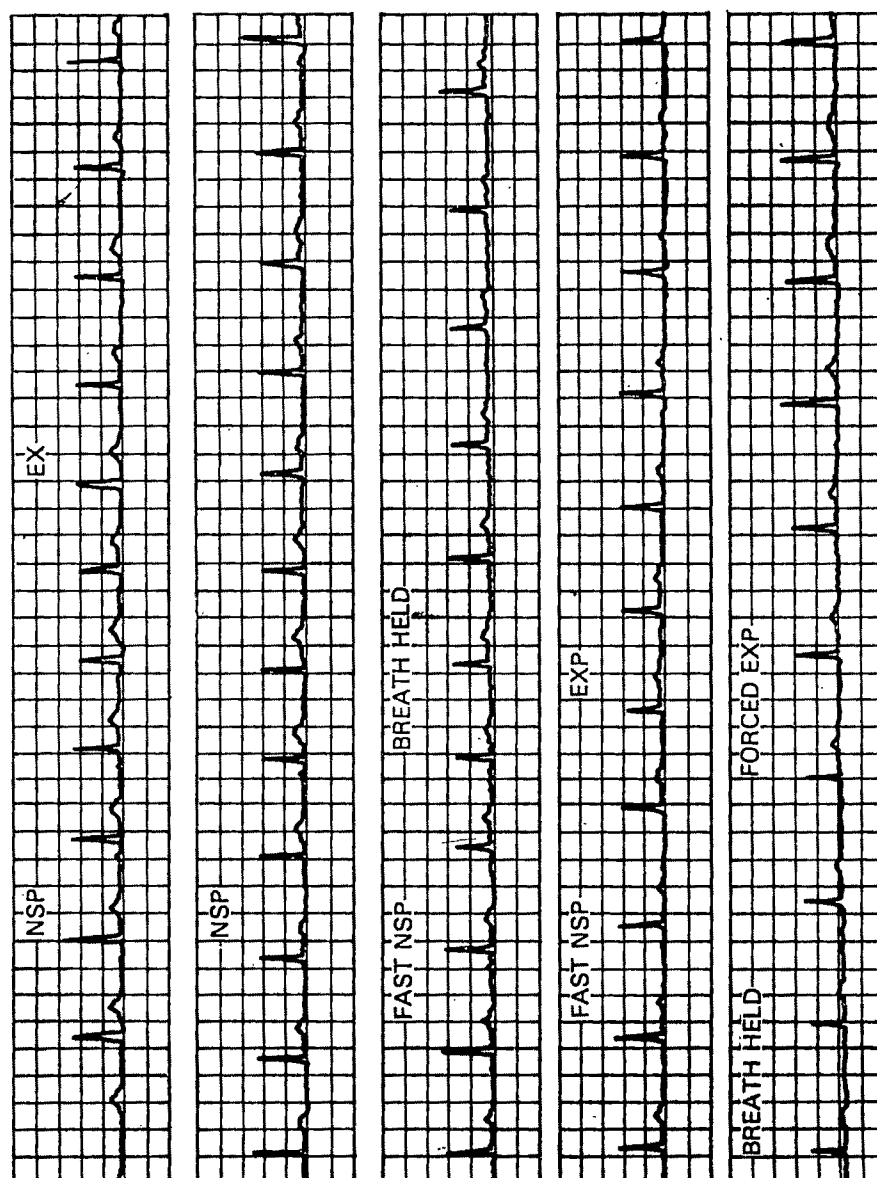


Fig. 3 (d) : Effect of respiration on heart rate

Unlike a book (Fig. 4a), which is designed to be read from the top of the page down and from cover to cover (linear information access), MM allows the users to access information any way they choose (non-linear information access). It is expected that different users may need different information at different times. In the Fig. 4b on the text page, an example of how the user may jump from highlighted words (hotwords) or phrases to other sections of text diagrams on any

page are shown, although all the pages of a book were loose and could be accessed in any order the user chooses. Thus MM is the most flexible and effective tool to learn. Many MM systems are based mostly on displaying various film clips to a passive user who does not get to navigate an information space. Only when the users interactively take control of a set of dynamic links among units of the information, does a system get to be MM.

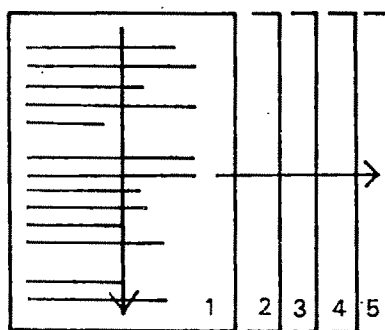


Fig. 4 (a) : Linear information access

ADVANTAGES

Navigation, computing aids, browsing, random access, speed, interactivity, accessibility, user friendliness, changeable structure, equal treatment, technology driven are some of the salient features of MM which is a very powerful IT for application of effective and efficient retrieval and presentation of information. Since the main output of this media is in visual form which is very familiar to the general public, it is likely to become more popular in future. There are many fields where MM has been used e.g. biomedicine, education, museum presentations, research and other computer supported co-operative works. The advantages of MM over conventional print version on paper are its structure, organisation and functionality. Browsing, reading interactiveness, etc. are more faster than print version. There are two and quarter inches disks coming with it which contains Hyper TIES (and HT system) version of that book. Print version of the book is not found as

effective as the computer version. MM system allows the users to browse and navigate quickly through any complex networks of information to locate references, definitions, comparisons, etc., from the nodal points created in the system which has a considerable potential in developing and using the research material courseware for the users. Following are some of the reasons for using MM as a tool for ISR.

- a) There is optimum freedom to use MM according to one's choice;
- b) MM/HM offers innumerable possibilities for teaching and learning of any subject. Database can be updated, edited, at any time;
- c) HM systems usually offer the possibilities to create, edit, sort and structure documents, and to view these structured documents later on according to requirements. The tools provide for documents creationware, partially very powerful;

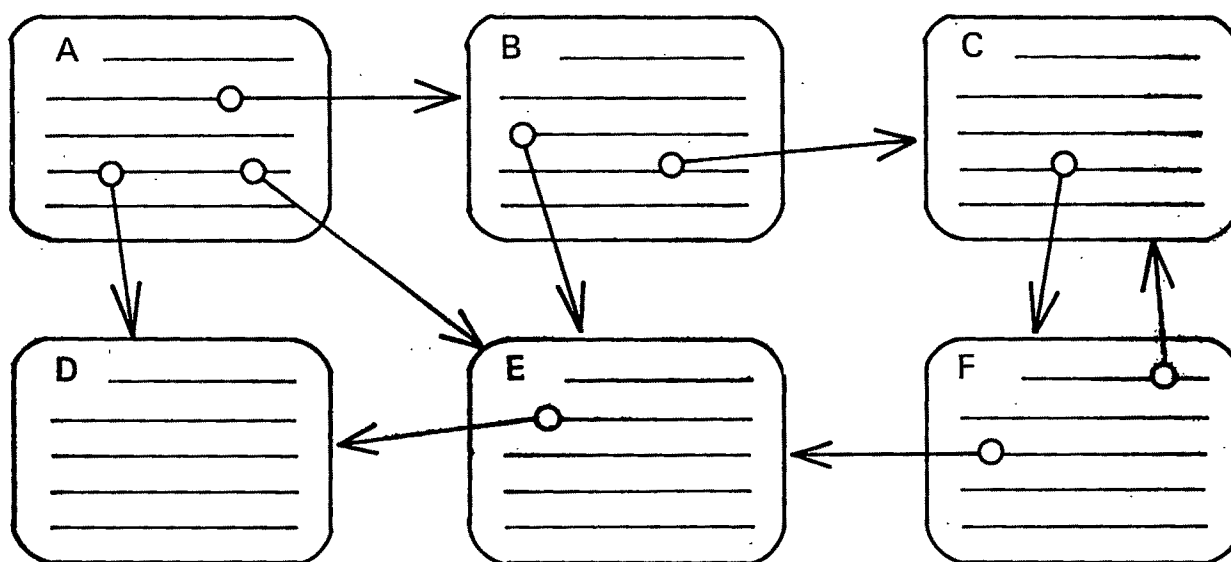


Fig. 4 (b) : Simplified view of a small hypertext structure having six nodes and nine links

- d) In MM/HM, a single form could serve the purpose of the different levels of users, depending upon their learning capacity and approach to the database while conventional printed materials differ according to the level of the users ;
- e) Resource sharing/Networking is one of the features of MM/HM which is useful for research and education;
- f) It's visual form enhances its usefulness. It has been clearly experienced that after using HT, users have improved their skills viz., creativity, flexibility, decision making, evaluation and synthesis of information;
- g) An integral part of MM is its interactive nature i.e. a user can point with a mouse and click on certain screen "object"; and
- h) Create 3-D effects in a dozen different ways, record thoughts about a new idea/letter and insert the recording into the document for later review.

DISADVANTAGES

- a) *Completeness* :
The problem of completeness in ISR is a serious issue which MM/HM and HT tends to irritate/exacerbate. It is costlier than conventional printed medium and going to affect the budget as well;
- b) *Standardization* :
Due to lack of standardisation in HM/MM and HT, the systems are incompatible;
- c) *Disinterestness* :
These databases are generally very large and the new user find it difficult to keep control of it, hence loses interest. There is also a possibility of getting lost in the system;
- d) *Portability* :
The systems are neither portable nor easily accessible like printed documents;
- e) *Copyright* :
Author's or designer's copyright of MM/HT HM software is not well protected;

- f) *Difficult for New Learner :*
It needs extra efforts for a new user to use system. Unless the user knows the reading skills, he/she cannot use the system effectively; and
- g) *Physical strain :*
It causes lot of physical strain on reader's eyes and mind. MM is still in laboratories, that is why this concept is not very much popularized [4].

MULTIMEDIA VS BIOMEDICAL LICs

MM will soon become accepted in everyday life like automated bank teller machines. There are some library applications for the ISR of scientific information. LICs certainly need to include electronic publications, like MM/HM, if they want to cope up with modern IT. In future, LICs might well be a computer network service rather than a building [5].

There are a number of good examples of MM products available in the market. A few of them are selected and presented here to give an idea of what is available in the biomedicine field.

Cardiology Education

Klingler, J.W. et al [6] have developed a computer based educational system for the cardiovascular imaging based on Hypercard and standard Macintosh II. This HM approach allows arbitrary complexity coupled with direct, immediate, easy traversal of the images and relates text, which provides the opportunity for the users to move the material and repeat as often as desired. The system includes a tutorial on the basis of digital image presentation and example studies from cineangiography, nuclear medicine, echocardiography, and magnetic resonance imaging of the heart. The system has proved useful as a primer for digital imaging in cardiology prior to specific case study in the traditional mental relationship.

Hyper-oncology

Hyper-oncology is a prototype HM-based workstation designed for the practicing radiation oncologists by Michael, P.A. and Foxlee, R.H. [7]. The individual patient records consist of linked demographic, clinical history, presentation, staging, course, laboratory, and treatment data. The system has the capability of searching, sorting, navi-

gational aids, printing, archiving, plotting, graphics and updation. This Hyper-oncology is going to be a comprehensive clinical database and information retrieval system specially in the radiation oncology.

As Textbook

"The Living Textbook of Pathology" is an interactive HT system developed to provide a frame work for interactive growth and updating of an under graduate pathology curriculum [8]. The living text system utilizes a metabase which is a database about the databases. This system consists of various types of information, like, what type of users, how and where can get and save the information, and who is (are) the author (s) of those information fragments, etc. A number of important lessons were developed on this system and the use of the system by the students was also recorded, which was very significant i.e. 3600 hours for all lessons. At that time they could not measure or find any direct impact on the undergraduate medical students because of its prototypeness, but found its usefulness for the continuing education of practicing physicians, even at the beginning of its development.

HM Programmes

HM programmes covering a variety of subjects are available, the most popular being anatomy, treatment of renal masses [9], neuroanatomy, neurosurgery [10], plastic surgery [11], rheumatology [12], hyper decision, histology, nuclear medicine, dental learning, radiology, pathology and cardiology. Interactive HM programmes are being developed and used in biomedical sciences, institutes, schools, in the developed countries.

Hyperpath

A programme developed in Cornell University Medical School Department of Pathology, combine text from a lecture notes with still and microphotographs to form an instructional tool for preclinical medical education [13]. Another programme, Interactive Medical Record (IMR) by Edward K Schultz, weaves together information from the clinical patient record in combination of text, sound, graphics, animation and videoimages [14]. As HM programmes are developed in developing countries and begin to play a larger role in biomedical science course work, LICs

serving these institutions will be under pressure to respond to this new system.

Tools for Teaching and Learning [15-29]

In biomedicine the scope of MM/HM is more than in other discipline viz., as teaching and learning research techniques, tools for operation theatre, precasting, etc., clear diagnostic tool, decision making. For example scientist/doctor, researcher or other user of biomedical information obtains his/her information from three main sources—own experiences, personal communication with others and textual materials (printed matter). In MM/HM one can present all the materials—text, audio, visual, graphics, etc. in a dynamic form which is more useful than any other traditional research, learning, teaching materials. MM/HM is a very user friendly and supports individual instructions to the beginner which is normally not available in conventional systems. It has been observed that those who had used MM were not only quick to grasp but also developed creativity, flexibility, decision making, analytical thinking and design skills than those who were using conventional materials [30, 31].

Professional DOC (P-DOC)

P-DOC is a software environment for electronic documentation, authoring and consultation based on HM [32]. It allows to manage different kinds of information viz. graphics, pictures, sound, texts, videos, etc. organised according to hyper structures. It is a very user friendly and available on the most common hardware platform, suitable for very broad category of the users.

Mammal

Mammal was developed by IBM in co-operation with National Geographical Society and provides information on 200 mammal species which includes colour photographs, maps of habitat locations, video of animal movements and animals sound [33, 34].

MM IN INDIA

National Informatics Centre (NIC), New Delhi has started some experimental work in this direction though the concept of MM/HM and HT is yet to be introduced in India. The concept of MM is spreading day by day and is being used for re-

search and educational purpose in most of the developed countries. Advancement in instruction delivery technology have a direct impact on biomedical research academic media centres. This new IT challenges information scientists, librarians, documentalists, etc. philosophically, financially and ethically to provide ethically access information instructional systems. MM is the method of using computerisation to improve access to a range of information carriers. The linking of various type of information viz., audio, image, text, visual, etc. can help to exploit more fully the content of LIC collections eg. CD, CD+ROM, CD-I, DVI, CD-TV and CD-ROM XA [34]. HM will be very useful in research and education, LICs where there are special HM projects called thesaurus, which link interactively a wide range of materials, yet still allows user to follow their own learning path. C-DAC (Pune) has also taken some projects; but it is not directly related to biomedicine and also a very preliminary study. The documentary programmes viz., 'Portrait of A City-Delhi Metropolis' 'Population on growth and environment', 'Castles in the Air' etc. developed by Central Institute of Educational Technology, NCERT, New Delhi based on MM are some of the notable developments in India. This new IT is yet to be known by most of the users as well as library professionals in the country.

The possibilities of information linking via MM are endless. The only real limitations are the programme creator's imagination and the software tools that are available. The later is important because MM is unlike normal computer programming and can not be tested using normal debugging techniques. Therefore, HM programmes are almost always written via authoring software (an authoring programme is a programme that writes other programmes). Using an authoring programme, the programme can concentrate on relational links whilst the authoring software takes care of the actual instructions needed to achieve that link and checks to make sure that no clashes occur in the flow of information or in the commands to the software components of the system.

The most interesting MM development of LIC and the museum world has been the advent of the compact disc, not just as a convenient way to listen to music but as a mass information storage medium. One of the principle data infrastructure used by ISR system designer is MM. It is an old concept that has finally come of age as the devel-

opment of computers, digitizing circuits, and compact disks have fulfilled the technical support required by it. However, it is the combination of novel hardware and software that will really open up the field of ISR to everyday user. Together, they allow the information presentation to be customized to individual users, who can widen or narrow the scope of their investigation to suit their needs. Furthermore, one of the key attributes of MM software programming is ease of use. Powerful data processing is combined with artificial intelligence (AI) programming to give a complex system that is intuitive to use. In India, there is a tremendous scope towards the MM.

SUGGESTIONS

1. Future studies on various aspects of HM/MM management should be encouraged. Biomedical librarians would benefit from the study of this new IT for collection development, policy, and personnel management;
2. As computer management networking of HM and image database become available it will be interesting to see the role of biomedical LICs in integrating these databases with the traditional information delivery system;
3. Effort should be made to adopt this new IT in our LICs and use it from classroom to surgical room via laboratories for ISR;
4. An user awareness environment should be created towards this system at local, regional and national level, as this IT is yet to be familiarised in India. User group must be taken into consideration while designing the system based on HM;
5. Short term new course on HM/MM, and HT should be introduced to the post graduate students in library and information science studies in India to give a basic understanding and to allow them to develop basic skills to use particular package.

CONCLUSION

Using MM, the user can put on a pair of goggles and a glove, tour a three-dimensional world that

exists only in the computer. Some recent studies show that this new IT have direct impact on biomedical LICs, as users of biomedical information system have responded positively. Further studies on various aspects of MM management should be encouraged [35]. (Academic and research biomedical LICs and librarians/information scientists would benefit from such studies.) It will be interesting to see that the role of biomedical LICs in linking the traditional information delivery system with modern MM/HM systems. LICs certainly need to include electronic publication like MM, if they want to keep up with modern IT.

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REFERENCES

1. KJELLD AHL (L) Ed. Multimedia; systems interaction and applications. (1st Eurographic Workshop, April 18/19, 1991). 1991. Springer Verlag; Berlin. (Abstract).
2. TWAY (Linda). Welcome to multimedia. 1992. MIS Press. pp. 5-16.
3. KJELLD AHL (L). *Op. Cit.*
4. SINGH (Surya Nath). Hypermedia : a flexible tool for medical information system. (Information Technology and Health Science Libraries. Paper presented at the MLAI-93 National Convention and Workshop, Oct. 13-16, New Delhi). MLAI Sp Pub. 1993. pp. 105-118.
5. SINGH (Surya Nath). *Op. Cit.* p. 112.
6. KINGLER, (J W) et al. Cardiology education using hypermedia and digital imagery. *Comput Methods Program Biomed.* 38 (2-3); 1992; 91-100 (Abstracts).

7. MICHAEL (P A) and FOXLEE(R H). Hyper Oncology: demonstration of an evolving comprehensive hypermedia based workstation for the radiation oncologist. Proc. Annual Symposium on Computer Applications in Medical Care. 1992. pp. 841-2 (Abstract).
8. THURSHKC (D'Frank M). An interactive hypertext of pathology. In Proc. 4th Annual Symposium on Computer Applications in Medical care. 1980. IEE; New York. pp. 1820-25.
9. RABUSHKA (L S) et al. Development of a computer assisted instructional tool for evaluation and treatment of renal masses: an experiment in hypermedia. *Invest Radiol.* 28, 2; 1993; 169-74 (Abstract).
10. COCHRANGE (D D) et al. The use of hypermedia for parent education in pediatric neurosurgery. *Pediatric Neurosurg.* 18, 5-6; 1992; 323-30.
11. WEBBER (W B) and RINEHART (G C). Computer based multi-media in plastic surgery education. Proc. Annual Symposium on Computer Applications in Medical Care. 1992. pp. 829-30 (Abstract).
12. NASHEL (D J) and MARTIN (J J). Image in rheumatology : a multimedia program for medical education. Proc. Annual Symposium on Computer Applications in Medical Care. 1992. pp. 798-9 (Abstract).
13. BECK (J R) and SPICER (D). *Op. Cit.*
14. MARTIN (G T), YOON (S S) and MUTT (K E). ZOOM, a generic personal computer based teaching programme to republic health and its application in schistromasomiasis control. *Bull WHO.* 6; 1969; 699-706.
15. ABURDENE (Patrica). COLORADO; megatrends for information. *Bull Med Lib Assoc.* 82; 1; 1994, January; 2-17.
16. BECK (J R) and SPICER (D). Hypermedia in academia. *Acad Comput.* 1988, Feb. 2-5; 22-5.
17. COLLINS (Anne M K) and WARD (Peter S). Development of library guidance system using interactive multimedia. In Bakker, Suzanne Ed. *Information Transfer : new age-new ways.* 1983. Kluwer Academic Publishers; London. 1983. pp. 111-118.
18. FELDMAN (Jony). Turn of the tide - a new age in multimedia publishing. *Ann Lib Sci Doc.* 39, 3; 1992; 86-88.
19. GUNNELL (C J) et al. Hypermedia in medical decision analysis: hyper decision. Proc. Annual Symposium on Computer Applications in Medical Care. 1991. pp. 956-7.
20. NELSON (T H). "The Hypertext". Proceedings of the World Documentation Federation, 1965. Quoted in Rammaiah, C.K. : Is hypertext a more flexible teaching tool for education. *Ann Lib Sci Doc.* 39, 1; 1992; 1-8.
21. NELSON (T H). Getting it out of our system. In *Information Retrieval: a critical view.* Ed. by George Schechier. 1967. Thompson Brook Co.; Washington. D.C. pp. 191-210.
22. NIELSON (Jacob). Hypertext and hypermedia. 1990. Academic Press; Bostan.; Chapt. 1-4.
23. QUCE (Gomes) and HOPGOOD (Lee) Eds. User interface management and design. 1991. Springer; Berlin. p.57.
24. ROBERTS (Stephen). Towards a pocket library. *IFLA J.* 18, 3; 1992; 259-68.
25. RAMMAIAH (C K). Is Hypertext a more flexible teaching tool for education. *Ann Lib Sci Doc.* 18, 3; 1992; 198-99.
26. PINION (Catherine F). Special Issue on audiovisual librarianship and multimedia technologies. *IFLA J.* 18, 3; 1992; 198-99.

27. SMITH (K E). Hypertext linking to the future. *On-line*. 12, 2; 1988; 32-40.
28. STENSAASSUZ(Annes). Animating the curriculum, integrating multimedia into teaching. *Bull Med Lib Assoc*. 82, 2; 1994; 133-39.
29. VULLO (R P) and EISNER (J). Dentle: the Dental Learning Environment: a prototype demonstration. Proceedings Annual Symposium on Computer Application in Medical Care. 1992. 800-1 (Abstracts).
30. BEEMAN (W O). Et al: Intermedia, a case study of innovation in higher education. providence, R.I.: Office of the programme analysis. 1987. IRIS Brow University.
31. LANDOW (G P). Hypertext in library education - criticism and scholarship. *Computers and the Humanities*. 1988, 23 July; 173-198.
32. ABBOLITO (A). et al. Professional DOC (PDOC); a software environment for authoring and consulting of electronic documentation. Interactive diagnosis and therapy: a medical application. Proc. Annual Symposium on Computer Applications in Medical Care. 1992. pp. 825-26 (Abstract).
33. YANKELOVICH (M) et al. Intermedia; the concept and the construction of a seamless information environment. *IEEE Computer*. 21, 1; 1988; 81-96.
34. RADHAKRISHAN (M G) and RADHAKRISHNAN (Meera). Evaluation of multimedia products - a case study. In Multimedia computer and communications. Ed. by N. Seshagiri and Aram Ahopov. 1992. McGraw-Hill Publishing Company Ltd.; New Delhi, INFOCOM 1992, Nov. 5-7, 1992 (Bombay), pp. 46-150.
35. WIDZINSKI (Lori). How hyper are we? a look at hypermedia management in academic health science libraries. *Bull Med Lib Assoc*. 81, 1; 1993; 58-59.

TERRITORIALITY AND TERRITORIAL BEHAVIOURS IN A MEDIUM SIZED ACADEMIC LIBRARY: A CASE STUDY FROM UNIVERSITY OF PORT HARCOURT, PORT HARCOURT, NIGERIA

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Studies the behavioral aspects of territorial practice - the evolution, nature and factors of territorial behaviour in library usage among University students. Structured questionnaire was used to elicit appropriate behavioral response while chi-square statistic was used to determine significant differences in the study variables. It was found out that territorial behaviour had assumed a high proportion in the University of Port Harcourt Library due to inadequate reading spaces, coupled with high population density.

INTRODUCTION

The three psychological needs, viz., identity, security and stimulation are as important as physical drives have long been realised and shown by ethologists [3]. It has also been pointed out that an optimum relation with place is essential to mental well-being and development of identity, and that a sense of place is a reinforcement to identity. Thus, the concept of territoriality evolved in the social sciences out of the need to understand man's craving for identity.

Territoriality is the process and mechanism by which living organisms lay claim to mark and defend their territory against rivals [4, 5]. The original ideas of territoriality was drawn from research by ethologists on non-human subjects but, today, it has been argued that the same principles are applicable to man [1, 5, 6, 7].

Many authorities have applied the concept of territoriality to spatial units of the size of the region or nation [8, 9]. As far as human beings are concerned, territoriality varies in size and intensity; as there are different scales of territoriality [10]. Territoriality takes two forms - the fixed, spatially

delimited personal territories and personal space [5, 10]. The first type of territoriality is motivated by physiological needs while the second is an essential ingredient in the internal dynamics of groups in which personal contact is avoided. On the basis of pervasiveness, personal involvement, duration and centrality to the everyday life of a person or group, Altman [11] distinguished territories into three - primary, secondary and public territories. Primary territories are socially recognised territories owned and used exclusively by individuals or groups, and for which invasion is not permitted; secondary territories have semi-public quality and are less closely identified with individual and less exclusive; while public territories have a temporary quality and may be used by almost anyone provided that they conform to basic social norms and standards. Public territories are, therefore, not owned by individuals but may be claimed by physical occupancy for a short period of time.

For the purpose of this work, the concept 'territory' is restricted to the micro-level and as defined by Gold [5], it is a "transitory and temporary occupation of space". This is important as university library is only public to the university community in which it is located.

Lorenz [2] argued that territoriality was more or less an expression of the aggressive nature in man, and represent both a product of the urge to gain and control of a particular portion of territory. Thus, defence has always been an element of territoriality providing the resistant mechanisms for those considered intruders. In the library situation, Kando [12] has observed that what needs to be defended is reading space to which an individual can lay temporary claim. In doing this, mark-

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ers are sometimes left behind to indicate ones claim [12, 13] while at times neighbors are made to inform potential intruders of temporary vacation of seats [13]. In other studies, Altman [11] and Gold [5] have shown that temporary occupants of places in libraries and parks make use of surrogates such as bags or newspapers to indicate physical occupation.

The rationale for the study of territorial behaviour in a library situation is the relevance to our understanding of human behaviour in the use of space. This becomes more relevant where a large population of users are not matched by appropriate facilities to make for a conducive study atmosphere. There is a general tendency therefore for users to seek territory through territorial behaviour and intense space use. The University of Port Harcourt library where this study was carried out exhibits the above characteristics.

The University of Port Harcourt was established as an affiliate college of the University of Lagos in 1975 and became a full-fledged university in 1976. Since then, the university has been operating in a temporary library waiting for the completion of the main library. The construction work on the library started in 1981 was scheduled for completion by

1984 but was abandoned in 1983. As a result, the temporary library has 583 person's reading spaces for a present population of over 7,000 full time students. Most Nigerian university libraries, especially the third and fourth generation universities, suffer from the problem of inadequate reading spaces, as is in the University of Port Harcourt. This trend seems to be a general one in almost all libraries in Nigeria. This inadequate facilities was pointed out by Obokoh and Arokoyu [14] in a study of the geographical location and use of public libraries in the city of Port Harcourt. Thus, the study of territorial behaviours in all types of libraries in Nigeria seems to be important not only because the knowledge gained from such a study can equip librarians with the tool of handling territorial behaviours in libraries but will also go a long way in enhancing the library administrator's bargaining power while making request for expansion of existing facilities due to increased demand.

CONCEPTUAL FRAMEWORK OF THE STUDY

In the endeavour to explain the incidence and evolution of territorial behaviour within a library context the work of Brown [15] has been used. He presented an analytical model for explaining the evolution of diversity in Avian territorial systems.

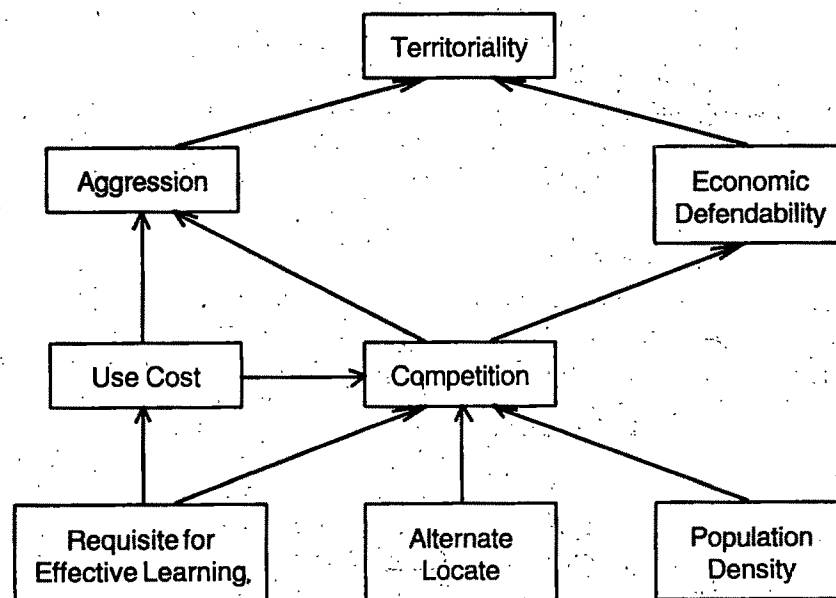


Fig. 1: Theoretical framework of library territorial behaviour*

* (Modified after Brown [15]).

The above analytical model conceives that competition is at the centre of territorial behaviour. It argues that competition is engendered by the perception of the library as providing the best requisite for effective learning, the absence of alternate reading location and high population density. The higher the perception of the importance of library to academic attainment, the higher the cost users are willing to bear and the level of competition for available library reading spaces. The higher the competition for library reading spaces the higher the perceived economic defendability, and the aggression employed in the acquisition and maintenance of reading territory. These ultimately define the type of evolutionary trend of territorial behaviour in the library. Since the requisite for which competition exists (in this case the university library) is economically defendable in terms of unhindered study advantages, in the absence of other equally conducive locations a continuous reinforcement of the use process involved remain necessary so as to maintain the *status quo* and prevent entrance.

METHODOLOGY OF STUDY

Data for the study was obtained from the University of Port Harcourt library users by means of a structured questionnaire. The questionnaire (Appendix) was designed to determine the causal factors in the evolution of territorial behaviour of the student in the use of the university library. The questionnaire was administered during a peak period with the help of six library assistants. Thirty minutes were given to the respondents to complete the questionnaire. Assistance was provided for problems in the completion of the questionnaire.

DATA ANALYSIS

The statistical method employed in the study was basically the *chi-square analysis*. The *chi-square* tests for significant differences in the determination of causal factors in the distribution of territorial behaviour in the use of the library among university students.

The first hypothesis states that, *the high incidence of territorial behaviour among university students is not related to availability of adequate reading spaces*.

To determine the reasons why students exhibit territorial behaviour in using a public facility like the library, and even go on to back it up with aggressive behaviour, the students themselves were made to provide the answers:

Table 1

Why students exhibit territorial behaviour in the library

Reasons for territorial behaviour	Responses
Competition for reading spaces	306 (70.7%)
A more convenient place to read	98 (22.5%)
Preference for a particular seat	24 (5.5%)
Desire to seat close to friends	7 (1.6%)
Total	435 (100%)

As the table indicates, about seventy percent of the 435 University of Port Harcourt students users are of the view that competition for reading spaces is responsible for territorial behaviour in library usage. Three other reasons given for this incidence seem to exert no serious influence as competition for reading spaces. Thus, territorial behaviour evolved from the struggle for use of limited reading spaces.

The second hypothesis states that, *the various settlement locations of students show no significant variation in their perception of the importance of territorial behaviour in the use of University library*.

The flow of students to the library from their various settlement locations is compared with their perception of the importance of territorial behaviour. There are three University campuses, namely, Choba Park, Delta Park and University Park. There are students staying off university campuses, in the villages around the University, namely Choba, Aluu and Alakhahia. The average walking distances from the three parks and villages are computed as follows:

TERRITORIALITY AND TERRITORIAL BEHAVIOURS IN A MEDIUM SIZED ACADEMIC LIBRARY

Table 2

Average commuting time from settlement locations to the library

Settlement location	Commuting time
Villages	35 minutes
Choba Park	5 minutes
Delta Park	18 minutes
University Park	40 minutes

To determine the effects of these locations on students perception of the importance of territorial behaviour the contingency table analysis is employed.

As the table indicates, there is a general tendency for library usage to decrease with increasing walking distance of the settlement locations of the students. Also, there is a tendency for students with longer walking distances from the library to show more positive perception to territorial behaviour than those with shorter walking distances. A test of significance on Table 3 using the *chi-square*

Table 3

Settlement locations and students perception of the importance of territorial behaviour in library usage

Settlement locations	Nature of perception			
	Positive	Negative	Indifference	Total Percentage
Villages	33 (71.7)	5 (10.9)	8 (17.4)	46 (100)
University Park	51 (73.9)	7 (10.1)	11 (16.0)	69 (100)
Delta Park	46 (41.1)	37 (33.0)	29 (25.9)	112 (100)
Choba Park	103 (49.5)	67 (32.2)	38 (18.3)	208 (100)
Total	233 (53.6)	116 (26.7)	86 (19.7)	435 (100)

indicates that the calculated value of 31.3 is much greater than the critical value of 12.6 (at six degrees of freedom and 95% confidence limit).

The implication, therefore, is that significant variations exist in the perception of the importance of territorial behaviour in relation to settlement locations in the use of university library.

The third hypothesis states that, *the perception of the importance of territorial behaviour in the use of the library is not significantly related to year of*

study. This hypothesis is tested using information supplied by the respondents in relation to their year of study and perception of the importance of territorial behaviour in library usage.

The *Chi-square* test indicates that at 95% confidence limit the *critical chi-square* value of 12.6 (at six degrees of freedom) is much lower than the calculated value of 48.86. This indicates that significant variation exists in the perception of the importance of the territorial behaviour in relation to the year of study.

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Table 4

Year of study and students' perception of the importance of territorial behaviour

Year of study	Perception of territorial behaviour			
	Positive (%)	Negative (%)	Indifference (%)	Total (%)
Year I	28 (33.3)	46 (54.8)	10 (11.9)	84 (100)
II	65 (59.1)	24 (21.8)	21 (19.1)	110 (100)
III	53 (51.5)	28 (27.2)	22 (21.3)	103 (100)
IV	87 (63.0)	18 (13.0)	33 (24.0)	138 (100)
Total	233 (53.6)	116 (26.7)	86 (19.7)	435 (100)

The fourth hypothesis states that, *students with no reading spaces outside the library tend to exhibit territorial behaviour than those with reading*

spaces outside the library. The *Chi-square* test was applied to the following data to determine if significant differences do exist.

Table 5

Reading spaces availability and territorial behaviour

Reading spaces	Exhibition of territorial behaviour		
	Exhibited (%)	Never (%)	Total (%)
Library only	123 (57.7)	90 (42.3)	213 (100)
Library and Hostel	110 (49.5)	112 (50.5)	222 (100)
Total	233 (53.6)	202 (46.4)	435 (100)

The calculated *chi-square* value of 2.93 is lower than the critical value of 3.8 at one degree of freedom and 95% confidence limit. This indicates the absence of significant difference.

territorial behaviours in the use of the library is not significantly different among the sexes.

This hypothesis was tested using information from the respondents and their sexes.

The fifth hypothesis states that, *the distribution of*

Table 6

Sex and exhibition of territorial behaviour in the library

Sex	Exhibition of territorial behaviour		
	Never (%)	Exhibited (%)	Total (%)
Male	42 (15.7)	226 (84.3)	268 (100)
Female	35 (21.0)	132 (79.0)	167 (100)
Total	77 (17.7)	358 (82.3)	435 (100)

At 95% confidence limit, the critical *chi-square* value of 3.8 (at one degree of freedom) is higher than the calculated value of 1.94. This indicates the absence of significant variation among the sexes in their exhibition of territorial behaviour.

The sixth hypothesis states that, *the distribution of aggressive behaviours in the use of the library is not significantly different among the sexes*. This hypothesis was tested with *Chi-square*.

Table 7

Sex and disposition to infringement of territorial space

Sex	Disposition		
	Affront (%)	Acceptable action (%)	Total (%)
Male	201 (75)	67 (25)	268 (100)
Female	96 (57.5)	71 (42.5)	167 (100)
Total	297 (67.8)	138 (32.2)	435 (100)

The *Chi-square test* shows that the calculated value of 14.54 is higher than the critical value 3.8 at one degree of freedom and 95% confidence limit. This shows that there is significant variation among the sexes in their consideration of infringement to territorial space as more males tend to consider it as affront.

The *chi-square test* on the 297 respondents who consider the infringements of their territorial space as an affront inspite of the use of surrogates indi-

cates (Table 8) that at 95% confidence limit, the critical *chi-square* value of 6.0 (at two degrees of freedom) is much lower than the calculated value of 17.66. This indicates that the distribution of aggressive behaviour in the defence of territory is significantly different among the sexes. While female students tends to show aggression through abusive words, the male on the other hand tend to show aggression through physical attack or threat of attack.

Table 8

Sex and distribution of aggressive behaviour in space defence

Sex	Distribution of aggressive behaviour			
	Use aggressive words	Disturb intruders	Eject intruders	Total
Male	60 (34.7)	78 (45.1)	35 (20.2)	173 (100)
Female	69 (55.6)	47 (37.9)	8 (6.5)	124 (100)
Total	129 (43.4)	125 (42.1)	43 (14.5)	297 (100)

CONCLUSION

This study indicates that there is a considerable inadequate reading spaces in the University of Port Harcourt. This inadequacy is the major cause of the high incidence of territorial behaviour which is of grave concern to users in the university library. As the library provides the best requisite for effective learning, the high population density which breeds scrambling for available reading spaces makes students who walk longer distances to the library to perceive territorial behaviour as very important in their bid for effective use of the library, and thus make their long walking distance economical. Also, it was found out that older students in the University tend to perceive territorial behaviour as very important in their use of the library. This might be related to the amount of work they have to do making use of the library and their acquired boldness resulting from their experience of coping with inadequate reading spaces. Somehow, survival of the fittest tends to be their watch-word.

As regards the roles of gender in the employment of territoriality in library usage, male and female students show no significant variation in the exhibition of territorial behaviour. However, there is significant variation in the disposition of the sexes to infringement of acquired territory in the library. Also, there is significant variation in the type of aggressive behaviour employed by the sexes in their defence of library reading spaces.

The essence of the findings is that a social vice called territoriality has become socially acceptable among the student populace of the University of

Port Harcourt. One often finds a situation in which in spite of many 'empty spaces' in the library one would still not be able to use any. This is quite embarrassing as surrogates are employed to keep possible users away.

This suggests of an urgent need for the University and the Federal Ministry of Education through the National University Commission to complete the main University library under construction. This is also the contention and plea of over 80 percent of the respondents. To heed this call is to begin to improve the reading habits of the students and to reduce an important area of conflicts.

REFERENCES

1. ARDREY (R). The territorial imperative: a personal inquiry into animal origin of property and nations. 1966. Atheneun; New York.
2. LORENZ (K). On aggression. 1966. Harcourt; New York.
3. MORRIS (R P). Single-factor analysis in population dynamics. *Ecology*. 40; 1959; 580-588.
4. JORDAN (Terry G) and Lester (Rowntree) The human masai: a thematic introduction to cultural geography; 2nd Ed. 1979. Harper and Row; New York.
5. GOLD (J R). An introduction to behavioural geography. 1980. Oxford University Press; Oxford.

6. FREEDMAN (Jonathan). Growding and behaviour. 1975. W.H. Freeman; San Francisco.
7. SPENCER (J E) and THOMAS (W C). Introductory cultural geography. 2nd Ed. 1978. John Wiley; New York.
8. SOJA (E W). The Political organization of Space, Commission on College Geography Resource, Paper 8, 1971. Washington. D.C. Association of American Geographers; D.C.
9. GOTTMANN (J). The significance of territory. 1973. University Press of Virginia; Charlottesville.
10. BLACKMORE (C C). Mechanics of the mind. 1977. Cambridge University Press; London.
11. ALTMAN (I). The environment and social behaviour. 1975. Cali, Brooks and Cole; Monterey.
12. KANDO (Thomas M). Social interaction. 1977. The C.V. Mosby; St Louis.
13. SOMMER (Robert) and BECKER (Franklin D). Territorial defence and the good neighbour. *In* Beyond the laboratory: a field study in social psychology. Ed. by Leonard Bukman and Thomas Henchey . 1972. McGraw Hill; New York. pp 173-181.
14. OBOKOH (N P) and AROKOYU (S B). The influence of geographical location on public library use; a case study from a developing country. *Bulletin of Geography and Map Division, SLA*. 163; 1991; 30-42.
15. BROWN (Jerram L). The evolution of diversity in Avian territorial system. *In* Territory: bench papers in animal behaviour; Edited by Allen Stokes. 1974. Dowden, Hutchisor and Ross; Stroudsbury, Penn.
16. LEYHAUSSEN (P). Dominance and territoriality as complemented in mammalian social structure. *In* A.H. Esser, Ed. Behaviour and environment: the use of space by animals and man. 1971. Plenum; London. pp 22-33.
17. EDNEY (J J). Human territory. *In* H.M. Preshansky and L.G. Rivlin, Ed. 1976.

QUESTIONNAIRE ON TERRITORIALITY AND TERRITORIAL BEHAVIOUR IN THE LIBRARY

Please answer the following questions.

Year of Study

Sex

Discipline

Park (If on Campus)

Village (If off Campus)

1. Which of these makes students colonise seats in the Library?
 - a) Competition for reading spaces.
 - b) Preference for a particular seat.
 - c) A more convenient place to read with concentration.
 - d) Seat close to friends.
2. You have been reading in a particular seat. You want to go to eat or go to lecture or to ease yourself; Which of the following do you resort to keep your seat?
 - a) Open your book to indicate your presence.
 - b) Ask a student next to you to take care in case an intruder comes.
 - c) Leave other personal property to show you are around.
3. If the seat is occupied despite any of the above, how would you regard this action?
 - a) Infringement of your reading territory or space.
 - b) An acceptable action.
4. To assert your territory in the library which of the following comes to your mind first?
 - a) Report intruder to library security personnel.
 - b) Appeal to the intruder to leave the seat.
 - c) Force the intruder out of the seat.
5. Which of the following aggressive behaviours do you resort to while defending your reading territory in the library?
 - a) Drag the intruder out of the seat.
 - b) Prevent the intruder from reading.
 - c) Use aggressive words.
 - d) None.
6. Could you say that defending your territory in the library is worth the trouble and so economical?
☐ Yes ☐ No
7. Would you say that seat colonization in the library is a good social behaviour?
☐ Yes ☐ No
8. If you can get a reading space anytime you go to the library, would you still engage in seat colonization? ☐ Yes ☐ No
9. Give two suggestions of what could be done to reduce territorial behaviours in Uniport Library.
 - a)
 - b)

TECHNOLOGY WATCH – CD-ROM*

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CD-ROM state of the art technology – technology and industry; new technology and applications - trends analysis; new investments made/planned - companies, level of investments; new products/markets; new alliances - inter - and intra-companies/countries; and market/technology forecast, as revealed in the literature, are discussed.

INTRODUCTION

Optical disks are spearheading second computer revolution. CD-ROM & CD-R (Compact Disc Read Only Memory and Compact Disc-Recordable) with stabilisation of optical disk mastering & replication technologies multimedia applications and associated standardisation for systems & software have provided the already entrenched PCs in networking environment with large-volume storage & data retrieval capabilities unavailable hitherto.

CD-ROM & CD-R belong to a family of Optical disks covering, besides these two, CD Audio, VideoCD, LaserDisc, CD-I, PhotoCD, EMODs etc. These operate on the basic principle of storing data by altering some optical properties of the media corresponding to digitised information, read through the laser mechanism.

Importance of CD-ROMs can be gauged from the fact that a typical 12 cm dia CD-ROM has a capacity of about 650 million characters, equivalent of 1,500 high density floppies or over 200,000 pages of printed text. Before CD-ROM, there was no practical way to deliver large volumes of data required to create big databases, or mixed text, data, graphics, audio, video & software. CD-ROM has enabled applications of multimedia in a practical way. Since CD-ROM is read only memory disc, there is no chance to accidentally

overwrite any information on a CD-ROM or infect it with a virus as normally encountered in floppy disk. Only 1.2 mm thick weighing about 50 gms, it is highly portable. With almost every aspect getting standardised (described later), technical standards enable a CD-ROM to be "portable" in a computer sense, across many types of systems.

With prices falling, CD-ROM databases are also gradually taking over from online databases, particularly those which are required in large volume thus amenable to mass production. Online search and retrieval costs are generally not fully predictable by its very nature, as in practice a lot of time is wasted on inefficient searches; it is also dependent on telecom links costing. On the other hand, CD-ROMs are targetted to specific needs; it puts the power of search back into the hands of the user. Generally, CD-ROMs have on them powerful user-friendly search software with potential for complex searches. Multi user access around already existing infrastructure of PCs & network with addition of only CD-ROMs and drives make cost-benefit ratio in favour of CD-ROM. Judicious selection of subject-specific CD-ROMs alongwith organisation-specific CD-Rs have envisioned "Subject-Specific Total Information Support" accessible right at the working-desk in multi-users environment a reality. This concept is even more pertinent for developing countries.

CD-ROMS TITLES TODAY : APPLICATION-MIX ANALYSIS

From its initial appearance in 1986 where just 48 CD-ROM titles and 48 companies were involved, in 1993, the industry grew to more than 5000 CD-ROMs with than 2500 companies and organisations involved. If the present trend continues,

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the total number of commercial CD-ROM titles available in 1994-end would stand at about 8,500. This itself is a perfect illustration of the development of CDRom industry and its acceptance by users.

Nicholls, Sutherland and Julien. (May 1994 CD-ROM Professional) have analysed the CD-ROM titles in print in 1993. A total of 4,422 unique, commercially available CD-ROM titles were identified and analysed from the 1993 editions of the main printed directories, viz.,

- (1) The CD-ROM Directory, Ed. M. Finlay, TFPL Publishing, London, UK 1993.
- (2) CD-ROMs in Print, Ed. R. Rega, Meckler Corporation, Westport, CT, USA, 1993.
- (3) CD-ROM Finder, Ed. J. Shelton, Learned Information, Medford NJ, USA, 1993.

The 4,422 titles represent an exponential growth of 38% over 1992 figures. Subject-wise distribution analysed as : Science & Technology (1070, 24%), General (931, 21%), Social Science (776, 18%), Business/Law (750, 17%), Art/Humanity (593, 13%) and Medicine (298, 7%). The overall proportion of indexing/abstracting databases constituted 16% ; source databases continue to be the most common type (44%) followed closely by directory and reference titles (40%). Of the source databases, most (47%) contained full-text, but those containing images, sounds or video clips (25%) are the fastest growing category. Other source databases contain numeric data (11%), software (7%) or mixed content (10%). Science & Technology continue to be the most common subject area.

Many observers have noted that CD-ROM finally became mainstream in 1993 and 1994 has seen consolidation and increasing larger role of multimedia.

PRE-MASTERING, MASTERING AND REPLICATION FACILITIES : SERVICE PROVIDERS, MANUFACTURERS

The manufacturing process for all CD-ROMs consists of premastering & replication process, summarised as follows :

Pre Mastering - This includes the input data preparation and application software development

to generate the required pre-mastered CD-tape. This is normally a U-MATIC or EXABYTE tape. This tape is then used in the mastering step.

Mastering - This consists of writing the data from the tape onto a disc master by a laser writing machine to produce a lacquer coating glass master disc. The pulse laser aimed at the rotating blank master discs vapourises microscopic portions to form tiny pits in the lacquer coating as the laser is switched on and off according to the codified information on the computer tape. This leaves a spiral track consisting of tiny pits in the lacquer. Glass master is then coated by Nickel to obtain nickel stamper which has all the information of the original glass master. This metal stamper is now used in the second process which is the replication process.

Replication process - Polycarbonate granules of the required purity are dried with hot air. The metal stamper (Aluminium stampers for CD audio; Nickel for CD-ROM) are inserted in the injection moulding machine cavity into which the polycarbonate granules are injected under high pressure and heated to about 300 degree C. After the cavity is full, the temperature is lowered and the mould opened. The polycarbonate with the desired pits formed on it is the next taken robotically to the sputtering cavity for vacuum metalisation. Aluminium vapours provide the reflective Aluminium coating. To protect the CD from contamination and surface damage a clear lacquer coating is applied by spin coating process. After further cleaning the label printing is done on the back of the disc, giving the information regarding the contents. Quality control and packaging are carried out next.

Worldwide several companies offer the capital equipment required for manufacture of CD-ROMs involving mastering and replication process.

Mastering equipment is available, amongst others, from :

1. ODME Holland
2. Nimbus UK
3. Leybold Germany
4. Optical Disc Cooperation, USA etc.

Suppliers of Replication technology & equipment include:

1. ODME Holland
2. Robi, Switzerland
3. TOOLEX Alfa
4. Sweden data Disc Germany
5. Firstlite USA
6. Multi-media Machinery Manufacturers, Switzerland
7. Sumitomo Electric, Japan etc.

Some of the companies which carry out CD-ROM - Premastering, Mastering and Replication for third party include :

1. AMERIC Disc Inc., Canada
2. Sony Subsidiary Companies such as a. DADC Austria - GmbH, Austria b. Digital Audio Disc Corp., Terrahaute, USA c. Publishing Data Services Corporation, USA d. Soni Electric Publishing Company, N.York, USA.
3. Denon Digital West Coast, California, USA.
4. DigiPress S.A. Cedex, France.
5. Disctronics Manufacturing (UK) Ltd., West Sussex, UK
6. JVC Disc America-Tuscaloos A L, USA.
7. Matsushita Electric Industrial Company Ltd., Osaka, Japan (National Panasonic Technics Quaser Brand Names)
8. Metatec Corporation, Dublin OH, USA (Also distributes titles published by third parties)
9. Mitsubishi Corporation, Tokyo, Japan
10. Nimbus Information Systems USA and UK
11. PDO Professional media, Netherland (subsidiary of Philips Electronics) (factories in Germany and UK also)
12. Sonopress Gutersloh Germany and London, UK
13. 3M Pre-recorded optical media St. Paul Mn., USA.
14. US Optical Disc Inc., Sanford ME, USA.
15. WEA Manufacturing, N.Y, USA.

CD-ROM DRIVES, PLATFORM AND SOFTWARE

CD-ROM Drives

CD-ROM drives are rapidly evolving to keep up with the giant growth in the CD-ROM applications. As a result, drives with more features and higher performance have emerged and the cost of such drives have fallen from \$1200 in 1991 to the present price of \$600. There are a number of manufacturers of new generation drives; the notables being Hitachi, Philips, Sony, Pioneer, Toshiba, Apple

Computers. Performance, physical characteristics, reliability and compatibility are the main issues while evaluating and selecting a suitable drive.

Performance is decided by the transfer rate of the data from the disc to the CPU. The rotational speed of the disc determines the speed of transfer. Double speed drives with a raw transfer rate of 300 KB/Sec have become the standard. Faster spinning speeds and the resulting greater data transfer rates benefit many multimedia applications. Hence, for the last few years, speed has been the single determining factor in the selection of a CD-ROM drive. Realising this, NEC has introduced recently, triple speed and quad speed drives to increase the throughput. By providing data buffers (64 KB or 256 KB) at the interface level, 1.5 to 4 MB/Sec burst data transfer rate is achieved. Drives with such faster data rates have a typical seek time of 200 to 300 milliseconds. The data capacity is either 540 MB or 680 MB depending on the laser read head and arm mechanism. In the future, we expect to see improved access time and transfer rates, increased reliability, smaller/thinner design and many times the present storage capacity, with multilayer recording surfaces.

Physical characteristics of CD drives include adapter/interface card, audio connections, the use of caddy, drive mounting mechanism etc. The CD-ROM kit comes with interface card, MS-DOS CD-ROM Extensions MSCDEX utility software and device drives software. Most of the CD-ROM drives support SCSI 1 and SCSI 2 adapter cards, except in some cases, where vendors provide propriety interface. SCSI-2 compatibility is important for network environments and high-end multimedia applications, where throughput is essential. Almost all models use the standard SONY caddy which prevent damage to discs.

Because of the improvements in performance of CD-ROM drives, major microcomputer vendors have endorsed the CD-ROM technology by re-orienting their systems to include CD-ROM drives. There are bundled offers of CD-ROM titles and drives from major database vendors. Also major computer vendors like DEC, Apple, SUN and others have been using CD-ROMs as an efficient mechanism for distribution of programs, manuals and other instructional materials. Freeman associates predict that by 1996, CD-ROM drives will account for 60 % of the optical drive market.

Platform Selection : CD-ROM on PC or Mac

In the present day scenario, CD-ROM applications are being built around either DOS/Windows based PCs or Apple Macintosh, as the majority of personal computing community falls into these categories.

Macintosh's built-in graphics and audio strengths, its reliance on single SCSI interface for connecting various peripheral devices, ease of use for DTP work and rich tools for multimedia applications, make Apple system, with a CD-ROM drive, an ideal choice for multimedia applications. But despite the advantages, the market base of Apple systems is much smaller compared to PCs. Hence CD-ROM products are targetted more towards DOS/Windows based PC customer base.

With wide variations in PC configurations, both in hardware and software, to take care of the compatibility issue, Multimedia Market Council has come out with a hardware standard called the Multimedia PC (MPC) specification for seamless integration of any CD-ROM product into any PC. The minimum components of MPC compliant system are: 16MHz 386SX with 2MB ram and above, super VGA display, CD-ROM drive with 32 KB cache and 8/16 bit audio interface and running MS-DOS/Windows 3.1.

As a result of the MPC specification, the market for CD-ROM/multimedia products on PCs has grown at the rate of 100% in the last two years. With the advantage of the known specification to work with, publishers are also adding hundreds of new titles or applications on CD-ROM each year.

The past two years were important for the entire CD-ROM/multimedia industry, due to the development of advanced technologies and standards in hardware and software and putting them together. Apart from information revolution, CD-ROM has opened the doors to the next computer revolution, the next wave of applications that make computing power even more important to a growing audience.

CD-ROM Retrieval Software & Networking of CD-ROMs

Information on CD-ROMs, text, audio or video can be accessed through the propriety retrieval soft-

ware built into the CD-ROM. The access software is available for DOS, MS Windows and MAC Windows with Graphical User Interface and online help facilities. The software from each publisher has been designed with powerful and efficient searching techniques for fast and optimised retrieval of information. Printing, downloading from CD to hard disk, browsing only topics or titles, viewing in multiple formats truncated phrase searching, security are some of the other features, that are built into the software.

Since the majority of CD-ROM applications, presently, are targetted towards PC and MAC environment, software solutions for multi-user access to the information on CD-ROMs are campus LAN based. Hence almost everyone provides simultaneous CD-ROM access to many users by putting multiple drives on a PC Server and connecting the server to the campus network. Another solution is to connect CD drives on a VAX/VMS or SUN/UNIX machine, with NFS software. The unix system is connected to the LAN and the server portion of NFS runs on UNIX machine. The CD drives are defined as "exportable" via NFS to the LAN. Any PC on the network and running the client version of NFS can access the CD-ROMs on the UNIX system.

SCSI Express from Micro Design International is a package of device drivers and utility software for SCSI devices and it is available for DOS and unix versions. The Unix version translates CD-ROM file format into a read-only mountable UNIX format. If the Unix machine is on the campus network, all UNIX users can access the CD-ROM files through normal UNIX commands. However, the search software, that comes along with the CD-ROM database, cannot be directly run without having DOS emulation software on the UNIX machine. DEC's Infoserer is the latest CD-ROM server, which connects directly to Ethernet and is therefore, accessible by any machine on the Ethernet or on a LAN attached to the Ethernet. So Infoserer systems serve information from devices to different client platforms in the native file format of that particular client.

STANDARDS

One quantity that makes CD-ROM stands out from other optical storage media is the existence of industrial standards and compatibility. Those who

are in CD-ROM profession are all familiar with Yellow Book and ISO 9660 standards, and its inter-relationship with Red Book, Green Book & Orange Book and now White Book and Blue Book w.r.t. CD-Audio, CD-I, CD-R, Video CD and High Density Compact Disc of ODC respectively. For details, readers may refer to these Books and some recent articles appearing particularly in CD-ROM Professional (May, 93, July/August 94 issues).

The *Red Book* gives the physical standards specifications for CD-audio. It specifies the A/D sampling rate (44.1 KHz). The parameters such as the pits and lands, sub code channel, index points and limited error corrections.

CD-ROM disc are recorded using the *Yellow Book* standard for the physical parameters. The file format is not defined in the yellow book. For this logical standards are required. The Yellow Book specifies two-kind of tracks, mode I and mode II. Mode I is for text and computer data and includes additional error correction code. Mode II is for audio and video data where data degradation is not so catastrophic or noticeable.

ISO 9660 was conceived as a joint effort of industry leaders called the *High Sierra Group* to provide a common file format for CD-ROMs for Apple, DOS and UNIX platforms. This logical standard provides for a system of files and directories to index the data consistently in all CD-ROM discs.

CD-ROM XA (extended architecture) was developed to extend the ability of CD-ROM to deliver synchronised mixed media. Whereas with standard CD-ROM, mixed media presentation would be done by chunks, causing a delay and lack of sequence, specially between audio and video, XA solves this problem by interleaving audio and video appropriately so that there is perfect synchronisation between the two while playing. Multi media presentations are thus considerably improved with regard to real time video and audio. XA provides for several levels of compressed audio in ADPCM form.

MPC (Multi media Personal Computer) is the standard for multi media, which defines both the minimum configuration for the hardware as well as

software which can play on this hardware. MPC may be considered a logical standard using CD-ROM physical standards. The audio is normally PCM (Pulse Code Modulated) at sampling rate 22.5 KHz or 11.023 KHz.

The *Green Book* standard which defines CD-I combines audio, video, text and computer data interleaved to allow seamless presentation with necessary error correction. This Green book standard has been incorporated partly in CD-ROM XA also called bridge disc. The green book defines an entire hardware and software system including the CPU, memory operating system, video and audio controllers as well as spatial compression methods. CD-I players are designed to connect with television and stereo system. The audio is ADPCM condensed. CD-ROM XA is geared to the computer market whereas CD-I is geared to the consumer market.

The *Orange Book* specifications have been developed for all CD-R appendable media. The orange book standard defines media only not drives. Photo CD, a application which need multi session write capability to store 35 mm photographs on CD-R uses Mode II of the Orange Book.

CD-R/CD-write-once require a new file of format which allows multi session recording and reading of partially recorded discs. This will require a new ISO format which is under development by a Committee called the Frankfurt group. This standard may eventually replace ISO 9660 since it is more flexible and supports UNIX and ISO 10646 etc. The main change would be the additional volume descriptors to be placed in sector 16 of each track rather than sector 16 of the first track only.

Recently specifications are being evolved for digital video on CD format. The logical standard is MPEG, a universal standard created by the Motion Picture Experts Group. MPEG-1 was announced in December 91 for limited bandwidth transmission. MPEG II is being designed for higher bandwidth transmissions. The physical platform for motion picture is still being decided upon.

Philips alongwith the other companies has announced the White Book standard for video CD in

August 93 [this is not the same as the CD video standard announced in 1988]. The White book was first published as CD Karaoke (already well established in Japan as a standard) in March 93 and is a concept implementation of CD-ROM XA using MPEG-1 video.

Optical Disc Corporation (ODC), USA has recently announced a Blue book standard in May 1994 for high density compact disc systems. Based in part on the IEC 908 specifications, and said to be conforming to applicable parts of ISO 9660, ISO 11172, ISO MPEG-2 (tentative specs.), the ODC Blue book is a standard for HDCD (High Density CD) with a maximum specifications of upto 4 times standard CD density using a 12 cm disc. (By specifying 6770 nm laser and 0.55 NA lens upto 3.3 Gbytes data can be supported).

MARKET FORECAST

While predictions are always difficult there are some trends which point to the future. The exponential growth of (i) CD-ROM titles, service providers, publishers, (ii) installation base of CD-ROM drives, (iii) software activities associated with CD-ROMs, (iv) company-interest-driven activities vying with each other to have their standards accepted at international level, (v) alliances amongst hitherto competitors to encash the future markets built on mutual strength etc., give a clear indication that CD-ROM business is set for rapid growth. Some of these indicators have been touched upon in the preceeding Sections.

In terms of organisations in CD-ROM business, it has already exceeded 2500 (Para. 2.1); in terms of CD-ROM titles internationally documented and generally widely used, it has exceeded 8000 nos. Range of coverage has also increased.

Another indicator is the installed CD-ROM drives base which has been estimated at 11.4 million units by Optical Publishing Industry Assessment (OPIA) in 1993; predictions of the installed base of CD-ROM drives over 15 million and more by the end of 1994 has been made. This rapid growth could be attributed to standardisation of Multimedia PC(MPC) specifications partially and also the fact that one has crossed over the critical mass to ensure CD-ROM and its drive as a stan-

dard attachment/interface and its acceptance in the computer world. Further, OPIA report puts worldwide CD-ROM titles and drive revenue to reach above \$35 billion in 1995.

That a large number of mastering and replicating facilities for CD-ROM manufacturers are already available in the world and the continuing investment in the sector is taking place also gives the indication of the future scenario.

TECHNOLOGY TRENDS

The developmental activities taking place in CD-ROM Technology are in the following main sectors:

Various ways to increase the storage capacity:

- (a) Using a Blue laser which has a shorter wavelength instead of the present Red laser being used for reading the CD-ROM, thereby improving the resolution and hence the data density. However, this blue laser technology is still at laboratory level.
- (b) Increasing the density of information using multi-level approach i.e. increasing the recording surfaces.

To reduce the size of CD-ROM to 3.1" (without loosing storage capacity) to increase the portability of CD-ROM drives.

To improve the economics and turn around time of production: In this regard, developments in CD-R are noteworthy. CD-R is a recordable compact disc with an additional photo absorption layer and a gold reflection layer in place of the aluminium. During recording energy of the focussed laser beam gets absorbed by photo absorption layer and lasers for temperature about the decomposition temperature of the dial. The polycarbonate substrate in direct contact with this gets heated to its glass transition temperature, expands and migrates into the photo absorption layer leading to tiny transparent pits analogous to those formed by pressure moulding in the case of CD-ROM. CD Recordable (CD-R) is especially useful for users needing limited number of copies, having company specific information, classified and sensitive information etc.

To provide for Multi-session Recording: Newer standards are being set up for CD-R to enable multi-session recording and reading of partially recorded discs. This is specially useful in Photo CD where 35 mm photographs may be stored on CD format.

INDIAN SCENARIO

Though CD-ROMs manufacturers and service providers with diverse application-mix have made significant impact in developed countries as can be seen from previous sections, it is yet to make major inroads on Indian scenario. Interest generated in recent times can be seen from the three-days "Workshop on CD-ROM Technology" organised by NICDROM, NAL Bangalore in collaboration with NISSAT, DSIR during 16-18th November 1993 followed by 3rd National CD-ROM/Online User Group Meet held at CLRI, Madras during August 9-10, 1994 again in collaboration with NISSAT.

A recent development in this regard is setting up of AHEAD - Asian Health, Environmental and Allied Databases- a consortium of owners of eight major Asian databases and information resources relating to health and environment. The consortium sponsored by International Development Research Centre IDRC, Canada, has initiated work on three CD-ROM databases - on environmental & water resources management, on occupational safety, health, natural toxins and tropical diseases and on Asian medicines & natural products. These are expected to be ready for sale by May'95 and will be marketed by Publication and Information Directorate (PID) of CSIR. The CD-ROMs would be initially published in Canada. There is scope for indigenous manufacturing with such facilities being set up within the country.

INSDOC has come out with CD-ROM version of the National Union Catalogue of Scientific Serials in India for the first time. Other organisations like National Patents Office, UPSC, NIC etc. are also exploring the different application & marketing for various possible CD-ROMs databases and some of them (NIC, INSDOC etc.) are setting up CD-R facilities to bring out specific CD-Rs of interest to limited users.

In terms of CD-ROM manufacturing facilities in India, recently a unit under EHTP scheme of DoE namely RC Laser Tech (India) Ltd. is being set-up at Gandhinagar, Gujarat with foreign collaboration. The company intends to provide comprehensive CD-ROM and other CD products and services.

CD-ROM Users Sector

The user segment of CD-ROM databases is fairly diversified and is enlarging continuously. As in the case of world market the demand for science and technology titles and bibliographic information is more than any other sector with institutions like IISc, IITs, AIIMS, and a few universities having and using the CD-ROMs for quite some time. National Centre for Information Science at IISc, Bangalore provides certain select CD-ROM search facilities.

At national level, the Department of Science and Industrial Resources (DSIR) has initiated a programme called National Information System for Science and Technology (NISSAT) to promote and support the development of a compatible set of Information systems on Science & Technology and interlinking these on a network. The ten sectoral information centers set up by NISSAT use the CD-ROM databases extensively for providing information support. One of the centres called NICDROM at NAL, Bangalore, promotes applications of information technology through CD-ROMs and provides information to various intending centres on CD-ROM hardware, software, suppliers, list of titles available, reference tools etc. The services are particularly useful for the new entrants into the CD-ROM information services.

Besides, there are quite a few information service providers covering a wide spectrum of specialisation. The major ones being NIC for health & patents sectors, Department of Electronics for electronics, computers and communication sector, DESIDOC for Defence & Standard, Central Pollution Control Board for pollution & environment sector, Bioinformatics/DBT for Biotechnology and the like. The user list is increasing day by day and it may not be possible to provide an exhaustive list. These efforts are pre-dominantly dependent

dent upon specialised international CD-ROM databases available in respective areas.

CONCLUSION

The article attempts to cover all objectives of Technology Watch. From the analysis presented, it may be concluded that CD-ROM (with their related versions) and their applications are going to be the biggest growth markets in the information technology in the next five years and India must plug-into this global market. India must also

encash on its comparative strength through: (i) its relatively low-cost data capturing capabilities tied-up with international CD-ROM producers & publishers; (ii) in premastering including software development; (iii) in preparing CD-ROMs of Indian music, handicrafts, fashion & garments, jewellery designs using proper CAD tools and marketing abroad; (iv) in creating its own CD-ROM databases on cultural heritage, tribal arts, archaeology, herbal & medicinal plants, traditional medicines and the like.

SHORT COMMUNICATION

PUBLICATION PATTERN IN SCIENTIFIC & INDUSTRIAL RESEARCH IN INDIA - A BIBLIOMETRIC STUDY

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Bibliometric analysis of papers published in the Journal of Scientific and Industrial Research (J.S.I.R) during the years 1988 to 1993 is presented. The authorship pattern, year-wise distribution, subject of coverage, organisation-wise distribution, study of references, average length of the articles, contribution from India and abroad, etc. have been analysed.

INTRODUCTION

Journal literature is an important source of information to disseminate new ideas for recent developments in any area of research and development work. Study of the papers published in a particular journal reveals the status and trends of research of different subject fields in which the journal is specialised.

The Journal of Scientific & Industrial Research, published by the Publication & Information Directorate, New Delhi holds a special position as to scientific and industrial research publication in India. Established in 1942, it is intended to fulfill the responsibility of helping the research workers to keep themselves abreast of current developments in various fields of science and technology. The journal carries editorial features highlighting important scientific events in India and abroad, articles on science policy and management of science, review articles on topics of current research

interest, technical reports on international and national conferences, review of scientific and technical publications, and notes on major advances in various fields. The study of JSIR will, therefore, reveal the trends of research as depicted through publication activities of research workers.

AIMS AND OBJECTIVES

The study has been undertaken with a view to examining the following :

- (i) Year-wise distribution of papers;
- (ii) Organisation-wise distribution;
- (iii) Authorship pattern;
- (iv) Subject-wise distribution;
- (v) Number of the references cited; and
- (vi) Average length of the articles.

METHODOLOGY

The study is based on the analysis of 333 articles published in the Journal of Scientific & Industrial Research (Vols. 47-52) (71 issues) during the years 1988-1993.

ANALYSIS OF PAPERS

The analysis of papers is presented in the following Tables 1-6.

Table 1

Year-wise Distribution of Papers

Year	India	Foreign	Ind/Fgn (Collaboration)	Total	% of total
1988	61	-	-	61	18.32
1989	39	6	-	45	13.52

Contd.

Table 1 (contd)

Year	India	Foreign	Ind/Fgn (Collaboration)	Total	% of total
1990	46	2	-	48	14.42
1991	40	12	-	52	15.61
1992	35	32	1	68	20.42
1993	53	6	-	59	17.71
6 Years	274	58	1	333	100

Table 2

Institution-wise contributions of papers

Institution	1988	1989	1990	1991	1992	1993	Total	% of total
University, academic and other institutions	23	20	15	2	25	15	100	30.03
Research Institutes (Other than C.S.I.R)	24	15	12	20	22	9	102	30.64
Govt. Depts/Ministries	2	4	3	3	1	6	19	5.71
C.S.I.R. Laboratories	11	5	14	11	18	22	81	24.32
Other Institutions	1	1	4	16	2	7	31	9.30
Total	61	45	48	52	68	59	333	100

Table 3

Authorship pattern

Authorship	1988	1989	1990	1991	1992	1993	Total	% of total
Single author	29	21	24	26	32	37	169	50.75
Two authors	18	17	13	16	18	16	98	29.43
More than Two authors	14	7	11	10	18	6	66	19.82
Total	61	45	48	52	68	59	333	100

PUBLICATION PATTERN IN SCIENTIFIC & INDUSTRIAL RESEARCH IN INDIA

Table 4

Subject-wise break-up of number of articles

Subject	1988	1989	1990	1991	1992	1993	Total	% of total
Information science	7	1	7	12	18	18	63	18.91
Applied science	13	4	5	2	12	6	42	12.62
Science policy	16	12	11	15	16	4	74	22.23
Management of sciences	4	9	9	11	4	7	44	13.22
Computer & general science	-	3	2	-	-	4	9	2.70
Current trends in science & technology	7	4	2	1	3	-	17	5.10
Research & progress	18	8	6	2	9	6	44	13.22
Conference/lectures/etc.	1	4	6	9	6	5	31	9.30
Economics	-	-	-	-	-	9	9	2.70
Total	61	45	48	52	68	59	333	100

Table 5

Analysis of number of cited references

No. of references (Cited)	1988	1989	1990	1991	1992	1993	Total	% of total
0	7	4	9	14	7	18	59	17.72
1-10	4	1	4	7	3	5	24	7.20
11-20	6	2	9	12	14	12	55	16.52
21-30	4	4	7	5	14	2	36	10.81
31-40	3	2	2	5	8	3	23	6.90
41-50	4	1	2	1	4	5	17	5.11
51-60	6	4	4	2	4	2	22	6.61
61-70	4	5	1	-	3	4	17	5.11
71-80	3	3	3	2	1	1	13	3.90
81-90	4	7	3	1	4	1	20	6
More than 90	16	12	4	3	6	6	47	14.12
Total	61	45	48	52	68	59	333	100

Table 6
Length of articles

No. of pages	1988	1989	1990	1991	1992	1993	Total	% of total
1-3	6	1	2	1	-	2	12	3.60
4-6	11	8	16	13	10	22	80	24.02
7-9	18	18	16	14	21	17	104	31.24
10-12	13	10	8	10	17	8	66	19.82
More than 12	13	8	6	14	20	10	71	21.32
Total	61	45	48	52	68	59	333	100

FINDINGS

The following findings are revealed from the analysis :

- (i) As many as 274 contributions (82.282%) were from India, only 58 (17.718%) articles were from other countries (Table-1).
- (ii) Number of articles published per year varied between 45 to 68 (Table 1).
- (iii) Majority of the contributions either belongs to educational and research institutions which together were 202 (60.67%) (Table 2).
- (iv) Contributions from C.S.I.R laboratories number 81 (24.32%) (Table 2).
- (v) Majority of the contributions i.e. 169 (50.75%) are by single author (Table 3), and 66 articles are by more than two authors (19.82%).
- (vi) Subject-wise break-up (Table 4) shows contributions in all areas of scientific and industrial research.
- (vii) 74 (22.23%) contributions are on the science policy in industrial research, followed by information science numbring 63 (18.91%) (Table 4).
- (viii) The analysis further shows that contributions in other subjects viz., Applied science (42 nos.) (12.62%), Management of sciences (44 nos.) (13.22%), Computer and general science (9 nos.) (2.70%), Current trends in science and technology (17 nos.) (5.10%), Research and progress in industrial devel-

opment (44 nos.) (13.22%), Conferences, lectures, and symposium on industrial policy and activities (31 nos.) (9.30%) (Table 4).

- (ix) No. of articles without references are 59 (17.72%) and were mostly from conferences, symposia and lectures etc. (Table 5).
- (x) 55 (16.52%) articles have cited 11-20 references; and 47 (14.12%) articles have cited more than 90 references. (Table 5).
- (xi) Maximum length of article varies between 7-9 pages (104 nos.) (31.24%) and minimum length of articles varies between 1-3 pages (12 nos.) (3.60%) (Table 6).

REFERENCES

1. MISHRA (Sanjaya) and MOHANTA (Rabindra Nath). Iaslic Bulletin: a bibliometric study. IASLIC Bulletin. 35, 3; 1990; 125-128.
2. SENGUPTA (I N). Bibliometrics and related concepts. Bibliometric Research. 1; 1988; 38-50.
3. SEN (B K). Indian contribution in bibliometrics 1958-1984 : a review. Annals of Library Science & Documentation. 33; 3; 1986; 85-87.
4. RAVICHANDRA RAO (I K). Bibliometrics: quantitative methods for library & information science. 1985. pp.179-180.

BOOK REVIEW

SINGH (SEWA). Indian library and information science literature (1990-1991). 1994. Concept Publishing Company; New Delhi. 396p. Price : Rs.525.00 (ISBN: 81-7022-523-X).

There has been a substantial development in the library and information science in India during the past few years and thus, it has resulted in the growth of professional literature published in journals and books, reports from various government and non-government agencies etc., proceedings of seminars/conferences organised by various national and state level and specialised associations.

In an effort for bibliographic control over the literature, this publication covers the library and information science literature published during 1990-1991 and thus attempts to cover the latest developments in the field available through various publications. The coverage in this bibliographical work includes the literature published (in English language only) in the form of books, monographs, reports, edited books, conference/seminar proceedings etc. and the papers by Indian authors in foreign documents and also, by foreign authors in Indian library and information science journals/books etc. A list of abbreviations of source documents with their explanations and a list of journals indexed are also given in this book.

The total number of citations in this book is 1412 and each citation is followed by an informative abstract. These citations are classified and arranged according to the 20th edition of Dewey Decimal Classification with extended schedules. Both, DDC numbers and subject headings are given to facilitate its use. The citations are arranged alphabetically by author/s under each subject heading and all references are numbered.

This book is divided into four parts covering citations on general knowledge, computers and bibliographies in one part, different aspects of library and information in second part, and other related subjects including library legislation in the third part. The last part contains the Subject Index and Author Index which refer to the citation number/s included in the first three parts. But the logic of such grouping is not clear viz., the placing of Computer Science, Bibliographies and General Knowledge in one group. Similarly, LAN, SIRNET, ERNET and INET may be utilised for library and information science (LIS) and basically these relate to the communication networks. It would have been better, had these found a separate grouping, as the present document relates to LIS and there should not have been any problem to appreciate their application in this field.

The value of the bibliography would have been enhanced, if an alphabetical index of at least the broader class numbers was provided to facilitate the exhaustive search quickly.

In spite of the fact that the literature of LIS published in regional languages is not reflected here and all the documents published in India during the period have not been covered in the book such as, Fundamentals of Library and Information Science, by Subedi Madhusudan and Sharma C D (1990); Standardization of Library and Information Services, by Deshmukh P P (1990) and some others, the attempt deserves praise as it will provide the base tool for literature search on the subject during the period.

– Reviewed by Mira Mathur

NOTES TO CONTRIBUTORS

The Annals of Library Science and Documentation publishes articles, documentation notes and research reviews on library, documentation and information science, information systems, services and products, information technology, information users, bibliometrics, scientometrics and informetrics, education and training and other related areas. The contributions should not have been published earlier or submitted elsewhere simultaneously.

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ROUT (K K). Operational management of university libraries in India. 1992. Reliance Publishing; New Delhi, p. 31-42.

Periodicals

VENKATESAN (G) and ZEEPHONQSEKUL (P). Cost optimization and quality control of products from queue with pre-emptive priority. *Opsearch*. 29, 4; 1992; 261-73.

WOOL (G J), AUSTHOF (B) and BRECKBILL (A). Cataloguing standards and machine translation : a study of reformatted ISBD records in an online catalog. *Information Technology and Libraries*. 12, 4; 1993; 383-403.

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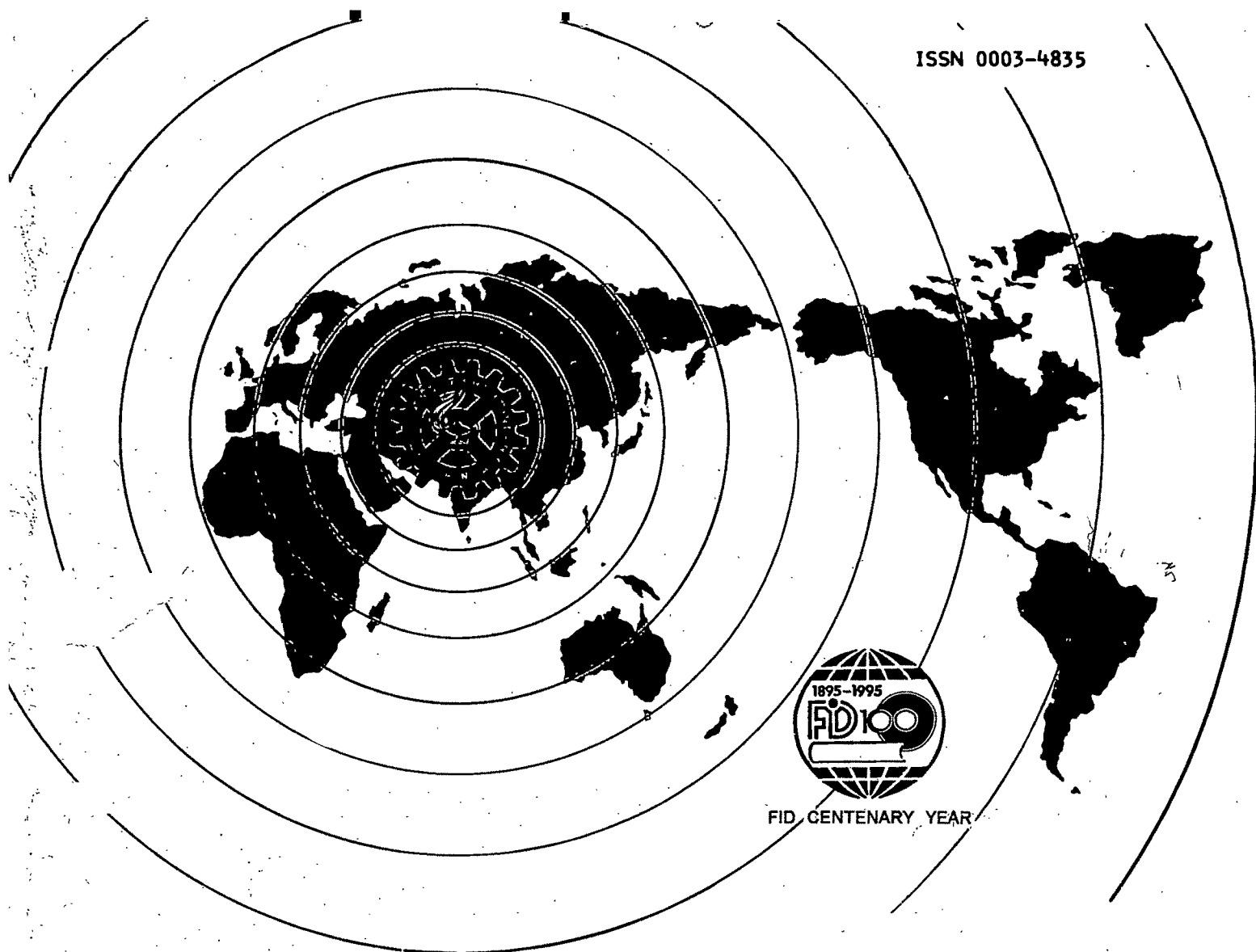
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BIBLIOGRAPHIC COUPLING : AN EMPIRICAL STUDY OF ECONOMICS

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The concept of bibliographic coupling developed by Fano and Kessler is empirically tested in two important sub-disciplines of Economics namely, Monetary Economics and Welfare Economics. All the pertinent research papers in these two sub-disciplines from two journals viz; 'American Economic Review' and 'The Economic Journal' over a period of ten years have been culled and 45 pairs have been established to ascertain the coupling strength. The study shows that though there are slightly fewer number of citations in the journal 'American Economic Review', the coupling strength is higher and consistent than 'The Economic Journal'. The tendency of researchers to refer or cite the relevant literature of the immediate past was also observed. This may be due to the fact that either the literature become out of date very quickly or the researchers may not be able to keep track of the entire literature that are being published in a particular discipline, though there are a few exceptions in the case of certain classic and outstanding research papers which are cited frequently. The coupling rate of the citations in American Economic Review has been found to be greater than The Economic Journal.

INTRODUCTION

Citation indexing has become a popular device for retrieval and searching of scientific literature in a field of research. Citation indices are providing information scientists with useful materials for studying literature patterns, information generation, propagation, etc. All such activities are based on the hypothesis that between a citing item and cited set of items, there is a cognitive relationship linkage of some form. The underlying philosophy is that the citing item makes use of some piece of information contained in the cited items for some purpose relevant to the context and content of it.

One of the techniques frequently used in bibliometrics is citation analysis and during the last three decades there has been a burgeoning work in this area. A systematic citation study helps in measuring the degree of interaction among the researchers.

One of the major concepts of bibliometrics is *bibliographic coupling* which occurs when two research papers cite one or more common papers in their works. Fano [1] and Kessler [2] independently suggested that if two different documents referred to a common document, then they should have some sort of proximity or similarity in their approach or study. If the number of common citations for two different papers be multiple rather than single, their strength of coupling is said to be more, implying that their cognitive contents are much closer to each other. Kessler [3,4] in a series of papers had further tried to establish the usefulness of this idea.

The notion of bibliographic coupling and its subsequent works have attracted attention of experts in bibliometrics and information analysis as an interesting area but have hardly taken off the ground. Martyn [5] states that "the main criticism is against the hypothesis that a common parental citation may be considered enough to ensure cognitive relationship". Sen and Gan [6] felt that the idea of bibliographic coupling should be theoretically elaborated and a general mathematical framework be evolved. Sharada and Sharma [7] recently carried out a study of bibliographic coupling in linguistic research by comparing the research papers published in an Indian journal *vis-a-vis* an American journal. In the present paper, an attempt is made to study the bibliographic coupling strength in the field of Economics.

METHODOLOGY

The idea of bibliographic coupling was developed by M.M. Kessler in 1955 at the Massachusetts Institute of Technology. He proposed the idea of obtaining a matrix of conditional relevance measure for any two articles in the following ways:

- (a) Establishing the coupling strength by identifying the common citations given in two papers, x_i and x_j in any field m and denoting this coupling strength by $m(x_i \cap x_j)$
- (b) Denoting the number of citations given in each of the articles x_i and x_j by $m(x_i)$ and $m(x_j)$ respectively;
- (c) The bibliographic coupling strength between two papers, i.e.

P_{ij} is defined as $m(x_i \cap x_j)/m(x_i)$

and $m(x_i \cap x_j)/m(x_j)$

A modified version of Kessler's formula is proposed here for measuring the strength of bibliographic coupling between two papers which is as follows:

Let i and j be two papers from any field. Let n_i , n_j and r_{ij} refer to the number of citations in the papers i , j and the number of citations that are common to both i and j respectively. The bibliographic coupling strength or the coupling index T_{ij} is given by the formula

$$T_{ij} = \frac{r_{ij}}{[n_i \times n_j]^{1/2}} \quad (1)$$

For the comparison of two or more sets of documents on different topics on the basis of their citations and also the bibliographic coupling, the following procedure is suggested.

Let there be N articles in a set and let n_i be the number of citations in i th articles, where $i = 1, 2, 3, \dots, N$. The minimum and maximum number of citations per articles are found, in addition to the average and standard deviations.

The mean or average of citations is given by

$$\bar{x} = \sum_{i=1}^N n_i / N \quad (2)$$

The standard deviation, which is a measure of variability in the data is given by

$$\alpha = \sqrt{\sum_{i=1}^N \frac{(n_i - \bar{x})^2}{(N - 1)}} \quad (3)$$

Different sets of documents can be compared by evaluating and comparing these statistics.

The bibliographic coupling strength T_{ij} can be computed for every pair in the set with the help of (1) for each of the n_{c2} where n_{c2} is the number of combinations of any two documents in a set of N documents.

SAMPLE

For this study, two journals, namely, American Economic Review and The Economic Journal published by the American Economic Association (U.S.A.) and the Royal Economic Society (U.K.) respectively have been chosen. Research papers belonging to two sub-disciplines of Economics—'Welfare Economics' and 'Monetary Economics' have been culled out from these two journals.

In each of these two areas ten research papers have been selected from each journal, thus, leading to a total of 40 research papers (Tables 1 and 2).

BIBLIOGRAPHIC COUPLING : AN EMPIRICAL STUDY OF ECONOMICS

Table 1

List of articles selected for bibliographic coupling

Subject : Monetary Economics

(a) Name of the Journal : The Economic Journal

Sl.no.	Author	Title	Vol. & Issue no.	Year	No. of citations
1.	Anderson, R.W. & Danthine, J.P.	Higher diversity in future markets	93 (370)	1983	32
2.	Djajic, S.	Currency management & economic stability	94 (374)	1984	29
3.	Marini, G.	Intertemporal substitution and the role of monetary policy	95 (377)	1985	20
4.	Cuddington, J.T. & Vinals, J.M.	Budget deficits and the current account in the presence of classical unemployment	96 (381)	1986	30
5.	Dornbush, R.	Exchange rate economics: 1986	97 (385)	1987	43
6.	Fisher, S.	Recent developments in economics	98 (391)	1988	259
7.	Svensson, L.E. & Wijabergen, S.V.	Excess capacity, monopolistic competition, and international transmission of monetary disturbances.	99 (397)	1989	22
8.	Jansen, D.W.	International substitution and the role of monetary policy: policy irrelevance once again	100 (401)	1990	18
9.	Miller, M. & Weller, P.	Exchange rate bands with price inertia	101 (409)	1991	38
10.	Lee, K.C., Pesaran, M.H. & Pierse, R.G.	Persistence of shocks and their sources in a multi-sectoral model of UK output growth	102	1992	28

(Contd.)

Table 1 (..Contd.)

(b) Name of the Journal : American Economic Review

Sl. no:	Author	Title	Vol. & Issue no.	Year	No. of Citations
1.	Bradford, C.	The money supply announcement puzzle: review & interpretation	73 (4)	1983	30
2.	King, R.G. & Plosser, C.I.	Money, credit and prices in a real business cycle	74 (3)	1984	38
3.	Aizemman, J. & Frankel, J.A.	Optimal wage indexation: foreign exchange intervention and monetary policy	75 (3)	1985	27
4.	Evans, G	A test for speculative bubbles in the Sterling-Dollar exchange rate-1981-84.	76 (4)	1986	48
5.	Frankel, J.A. & Froot, K.A.	Using survey data to test standard proposition regarding exchange rate expectation	77 (1)	1987	33
6.	Boyle, W.G. & Young, K.A.	Asset prices, commodity prices and money : a general equilibrium rational expectation model	78 (1)	1988	28
7.	Froot, K.A. & Klemperer, P.D.	Exchange rate pass-through when market share matters	79 (4)	1989	38
8.	Engel, C. & Hamilton, J.D.	Long swings in the Dollar: are they in the data and do the markets know it?	80 (4)	1990	48
9.	Alogoskoufis, G.S. & Smith, R.	The Phillips Curve, the persistence of inflation and the lucas critique: evidence from exchange rate regimes	81 (5)	1991	49
10.	McLeod, D.W.B & Malcomson, J.M.	Investments, holdup and the form of market	83 (4)	1993	42

BIBLIOGRAPHIC COUPLING : AN EMPIRICAL STUDY OF ECONOMICS

Table 2

List of articles selected for bibliographic coupling

Subject : Welfare Economics

(a) Name of the journal : The Economic Journal

Sl. no.	Author	Title	Vol. & Issue no.	Year	No. of citations
1.	Gordon, R.J.	Why U.S. wage and employment behaviour differs from that in Britain & Japan	92 (365)	1982	60
2.	Kennally, G.F.	Some consequences of opening a Neo-Keynesian model	93 (370)	1983	23
3.	Kooiman, P.	Smoothing the aggregate fix-price model and the use of business survey data	94 (376)	1984	26
4.	Evans, G.	Bottlenecks and the Phillips Curve: a disaggregate Keynesian model of inflation, output & unemployment	95 (378)	1985	25
5.	Matusz, S.J.	Implicit contracts, unemployment and international trade	96 (382)	1986	21
6.	Newbery, M.D. & Stiglitz, J.E	Wage rigidity, implicit contracts, unemployment and economic efficiency	97 (386)	1987	14
7.	Burgers, S.M.	Employment adjustment in U.K. manufacturing	98 (389)	1988	29
8.	Dowrick-Steve	Union-oligopoly bargaining	99 (398)	1989	37
9.	Nickell, S.	Unemployment: a survey	100 (401)	1990	262
10.	Hendricks, W.E. & Kahn, L.M.	Efficiency wages, monopoly unions and efficient bargaining	101 (408)	1991	25

(Contd.)

Table 2 (..Contd.)

(b) Name of the journal : American Economic Review

Sl. no.	Author	Title	Vol. & Issue No.	Year	No. of citations
1.	Bull, C.	Implicit contracts in the absence of enforcement and risk aversion	73 (4)	1983	25
2.	Miyazaki, H.	Internal bargaining, labour contracts and a Marshallian Theory of the firm	74 (3)	1984	25
3.	Shultz, C.L.	Micro economics efficiency and nominal wage stickiness	75 (1)	1985	39
4.	Kahneman, D., Kuetsch, J.M. & Thaler, R.	Fairness as a constraint on profit seeking; entitlements in the market	76 (4)	1986	31
5.	Abowd, J.M. & Card, D.	Intertemporal labour supply long-term employment contracts	77 (1)	1987	32
6.	Arnott, R., Hosios, A.J. & & Stiglitz, J.	Implicit contracts, labour mobility and unemployment	78 (5)	1988	32
7.	Brown, J.N.	Why do wages increase with tenure? On the job training and life-cycle wage growth observed within firms	79 (5)	1989	31
8.	Card, D.	Unexpected inflation, real wages and employment determinations in union contracts	80 (4)	1990	37
9.	Currie, J & McConnell S.	Collective bargaining in public sector: the effect of legal structure on disputed costs & wages	81 (4)	1991	38
10.	Crampton, P.C. & Tracy, J.S.	Strikes and hold-outs in wage bargaining: theory	82 (1)	1992	25

From each set all the ten articles are considered in pairs and, thus, leading to 45 pairs. For every pair, x_i , x_j and T_{ij} were noted and calculated. The

details of these citations and couplings are given in Tables 3, 4, 5 and 6. Thereafter, the coupling index has been calculated using the formula (1).

BIBLIOGRAPHIC COUPLING : AN EMPIRICAL STUDY OF ECONOMICS

Table 3

Bibliographic coupling in Monetary Economics

(a) Name of the journal :The Economic Journal

Sl. no.	Couple	N _i	N _j	R _{ij}	$T_{ij} = [R_{ij} / \sqrt{N_i N_j}]$
1	1, 2	32	29	0	0
2	1, 3	32	20	0	0
3	1, 4	32	30	0	0
4	1, 5	32	43	0	0
5	1, 6	32	259	0	0
6	1, 7	32	22	0	0
7	1, 8	32	18	0	0
8	1, 9	32	38	0	0
9	1, 10	32	28	0	0
10	2, 3	29	20	0	0
11	2, 4	29	30	2	0.07
12	2, 5	29	43	1	0.028
13	2, 6	29	259	0	0
14	2, 7	29	22	0	0
15	2, 8	29	18	0	0
16	2, 9	29	38	2	0.06
17	2, 10	29	28	0	0
18	3, 4	20	30	0	0
19	3, 5	20	43	0	0
20	3, 6	20	259	4	0.056
21	3, 7	20	22	0	0
22	3, 8	20	18	0	0
23	3, 9	20	38	7	0.25
24	3, 10	20	28	0	0
25	4, 5	30	43	0	0
26	4, 6	30	259	2	0.022
27	4, 7	30	22	3	0.12
28	4, 8	30	18	0	0
29	4, 9	30	38	0	0
30	4, 10	30	28	0	0
31	5, 6	43	259	1	0.009
32	5, 7	43	22	2	0.065
33	5, 8	43	18	0	0
34	5, 9	43	38	2	0.049
35	5, 10	43	28	0	0
36	6, 7	259	22	4	0.052
37	6, 8	259	18	5	0.052
38	6, 9	259	38	0	0.07
39	6, 10	259	28	3	0.035
40	7, 8	22	18	0	0
41	7, 9	22	38	0	0
42	7, 10	22	28	0	0
43	8, 9	18	38	0	0
44	8, 10	18	28	0	0
45	9, 10	38	28	0	0

Table 4

Bibliographic coupling in Monetary Economics

(b) Name of the journal : American Economic Review

Sl. no.	Couple	N _i	N _j	R _{ij}	$T_{ij} = [R_{ij} / \sqrt{N_i N_j}]$
1	1, 2	30	38	2	0.06
2	1, 3	30	27	0	0
3	1, 4	30	48	1	0.026
4	1, 5	30	33	1	0.031
5	1, 6	30	28	2	0.07
6	1, 7	30	38	0	0
7	1, 8	30	48	1	0.026
8	1, 9	30	49	0	0
9	1, 10	30	42	0	0
10	2, 3	38	27	2	0.06
11	2, 4	38	48	0	0
12	2, 5	38	33	0	0
13	2, 6	38	28	2	0.06
14	2, 7	38	38	0	0
15	2, 8	38	48	0	0
16	2, 9	38	49	1	0.023
17	2, 10	38	42	1	0.025
18	3, 4	27	48	1	0.027
19	3, 5	27	33	0	0
20	3, 6	27	28	0	0
21	3, 7	27	38	0	0
22	3, 8	27	48	0	0
23	3, 9	27	49	0	0
24	3, 10	27	42	2	0.06
25	4, 5	48	33	5	0.125
26	4, 6	48	28	1	0.027
27	4, 7	48	38	0	0
28	4, 8	48	48	4	0.083
29	4, 9	48	49	2	0.041
30	4, 10	48	42	0	0
31	5, 6	33	28	0	0
32	5, 7	33	38	1	0.028
33	5, 8	33	48	5	0.125
34	5, 9	33	49	0	0
35	5, 10	33	42	0	0
36	6, 7	28	38	0	0
37	6, 8	28	48	0	0
38	6, 9	28	49	3	0.08
39	6, 10	28	42	0	0
40	7, 8	38	48	1	0.023
41	7, 9	38	49	0	0
42	7, 10	38	42	0	0
43	8, 9	48	49	0	0
44	8, 10	48	42	0	0
45	9, 10	49	42	1	0.022

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Table 5

Bibliographic coupling in Welfare Economics

(a) Name of the Journal: The Economic Journal

Sl. no.	Couple	N _i	N _j	R _{ij}	$T_{ij} = [R_{ij} / \sqrt{N_i N_j}]$
1	1, 2	60	23	2	0.054
2	1, 3	60	26	2	0.051
3	1, 4	60	25	5	0.13
4	1, 5	60	21	5	0.14
5	1, 6	60	14	3	0.10
6	1, 7	60	29	0	0
7	1, 8	60	37	0	0
8	1, 9	60	262	7	0.056
9	1, 10	60	25	0	0
10	2, 3	23	26	3	0.122
11	2, 4	23	25	4	0.167
12	2, 5	23	21	0	0
13	2, 6	23	14	0	0
14	2, 7	23	29	0	0
15	2, 8	23	37	0	0
16	2, 9	23	262	0	0
17	2, 10	23	25	0	0
18	3, 4	26	25	3	0.12
19	3, 5	26	21	0	0
20	3, 6	26	14	0	0
21	3, 7	26	29	0	0
22	3, 8	26	37	0	0
23	3, 9	26	262	0	0
24	3, 10	26	25	0	0
25	4, 5	25	21	0	0
26	4, 6	25	14	0	0
27	4, 7	25	29	0	0
28	4, 8	25	37	0	0
29	4, 9	25	262	5	0.06
30	4, 10	25	25	0	0
31	5, 6	21	14	4	0.23
32	5, 7	21	29	0	0
33	5, 8	21	37	0	0
34	5, 9	21	262	5	0.067
35	5, 10	21	25	0	0
36	6, 7	14	29	0	0
37	6, 8	14	37	0	0
38	6, 9	14	262	7	0.12
39	6, 10	14	25	0	0
40	7, 8	29	37	3	0.09
41	7, 9	29	262	7	0.08
42	7, 10	29	25	2	0.07
43	8, 9	37	262	4	0.04
44	8, 10	37	25	6	0.197
45	9, 10	262	25	7	0.086

Table 6

Bibliographic coupling in Welfare Economics

(b) Name of the Journal: American Economic Review

Sl. no.	Couple	N _i	N _j	R _{ij}	$T_{ij} = [R_{ij}/\sqrt{N_i \times N_j}]$
1	1, 2	25	25	4	0.16
2	1, 3	25	39	5	0.16
3	1, 4	25	31	2	0.07
4	1, 5	25	32	3	0.11
5	1, 6	25	32	6	0.21
6	1, 7	25	31	2	0.07
7	1, 8	25	37	0	0
8	1, 9	25	38	0	0
9	1, 10	25	45	0	0
10	2, 3	25	39	5	0.16
11	2, 4	25	31	2	0.07
12	2, 5	25	32	2	0.07
13	2, 6	25	32	3	0.11
14	2, 7	25	31	0	0
15	2, 8	25	37	3	0.099
16	2, 9	25	38	0	0
17	2, 10	25	45	0	0
18	3, 4	39	31	3	0.086
19	3, 5	39	32	5	0.14
20	3, 6	39	32	4	0.11
21	3, 7	39	31	1	0.028
22	3, 8	39	37	3	0.08
23	3, 9	39	38	0	0
24	3, 10	39	45	0	0
25	4, 5	31	32	3	0.09
26	4, 6	31	32	2	0.06
27	4, 7	31	31	0	0
28	4, 8	31	37	0	0
29	4, 9	31	38	0	0
30	4, 10	31	45	0	0
31	5, 6	32	32	4	0.125
32	5, 7	32	31	1	0.03
33	5, 8	32	37	3	0.087
34	5, 9	32	38	0	0
35	5, 10	32	45	0	0
36	6, 7	32	31	0	0
37	6, 8	32	37	1	0.029
38	6, 9	32	38	0	0
39	6, 10	32	45	0	0
40	7, 8	31	37	0	0
41	7, 9	31	38	0	0
42	7, 10	31	45	0	0
43	8, 9	37	38	2	0.053
44	8, 10	37	45	1	0.024
45	9, 10	38	45	2	0.048

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The statistical details pertaining to 'Monetary Economics' and 'Welfare Economics' have been ascertained individually for two journals. Table 7 gives a compendious picture of the statistical parameters which *inter alia*, give details for each subject the

minimum, maximum and average number of citations. The range of citations among the ten research papers and the dispersion of citations are measured with the help of standard deviation and mean deviation.

Table 7

Parameter patterns of citations per article

Journal	Statistical parameters	Subjects	
		Monetary Economics	Welfare Economics
The Economic Journal	Minimum citations	18.00	14.00
	Maximum citations	259.00	262.00
	Average citations	51.90	52.20
	Standard deviation	73.17	74.75
	Range	241.00	248.00
	Mean deviation	41.42	43.52
American Economic Review	Minimum citations	28.00	25.00
	Maximum citations	49.00	45.00
	Average citations	38.10	33.50
	Standard deviation	8.48	5.74
	Range	21.00	20.00
	Mean deviation	6.93	4.70

Since some of the papers do not have common citations, a coupling rate is arrived at for each sub-discipline, separately, for both the journals by using the formula

$$\text{Coupling Rate (Cr.)} = \frac{\text{No. of pairs having common citations}}{\text{Total No. of pairs}} \times 100$$

After calculating the coupling index for each pair, minimum, maximum and average indices were calculated for each sub-discipline in both the journals. These details are exhibited in Table 8.

ANALYSIS

It would be obvious from Table 7 that research papers from 'The Economic Journal' tend to give more

number of average citations per paper than 'American Economic Review'. This has been due to the fact that in both the sub-disciplines of 'The Economic Journal' there has been a survey article which has reviewed the literature pertaining to both the sub-disciplines quite extensively, resulting in the high rate of average citations. The table also shows that the minimum number of citations appear in 'The Economic Journal' itself.

Further, the range of citations in all the four sets of research papers shows that there has been quite a huge range among the articles of 'The Economic Journal'. The range of papers appearing in 'American Economic review' is quite negligible.

When the subjects are compared, the trends are more or less same for both the journals. This is

due to the fact that both the sub-disciplines play an equally important role in the field of Economics (Table 8).

From Table 8, it is quite clear that the coupling rate is slightly higher for the journal 'American Economic Review' than 'The Economic Journal'. In both the sub-disciplines the rate of coupling has been higher for 'American Economic Review' than

'The Economic Journal'. There has been a high rate of 55.55% coupling in *welfare economics* and a low rate of 28.88% in *monetary economics*. A sharp contrast was noticed here, that though there are more number of citations in 'The Economic Journal' there has been a low rate of coupling exhibited among the citations of various pairs of research papers.

Table 8

Bibliographic coupling

Journal	Subjects			
	Monetary Economics		Welfare Economics	
	Bibliographic coupling index	Coupling rate	Bibliographic coupling index	Coupling rate
The Economic Journal	Maximum 0.25	28.88%	Maximum 0.23	42.22%
	Minimum 0.009		Minimum 0.04	
	Average 0.068		Average 0.103	
American Economic Review	Maximum 0.125	44.44%	Maximum 0.21	55.55%
	Minimum 0.022		Minimum 0.024	
	Average 0.051		Average 0.091	

Another interesting finding of the study is that throughout the citations, bibliographic coupling is observed among the papers of immediate past (Tables 3, 4, 5 and 6) which shows that majority of the researchers tend to refer the most recent literature for their study. It was observed in the study that most of the authors invariably referred to at least a few outstanding and classic research papers pertaining to each sub-discipline. There have been a few notable contributors like Azardio Costas, Barro Robert, Baily Martin in the field of *welfare economics* and Rudiger Dornbush, Robert Lucas, Stanley Fisher, Jeffery Frankel, Kenneth Froot and James Tobin in the field of *monetary economics* whose research papers have been frequently cited.

CONCLUSIONS

The following observations can be drawn from this study :

- (1) There has been very little to choose between the two journals from the point of view of number of citations, though the average citations are greater in 'The Economic Journal' due to the presence of survey articles. In fact, both the journals cite more or less in a similar fashion. The variability is less for 'American Economic Review' than 'The Economic Journal'. This is amply evidenced by the presence of high coupling rate in the journal ('American Economic Review').

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- (2) There have been a marginally higher number of citations in the discipline of *monetary economics* than *welfare economics*.
- (3) A higher rate of coupling has been observed in the discipline of *welfare economics* than *monetary economics* in both the journals.
- (4) Comparatively, a higher rate of variation can be observed in the discipline of *welfare economics* of 'The Economic Journal' and that of *monetary economics* in 'American Economic Review'.
- (5) The range of citations is larger in the case of 'The Economic Journal' than 'American Economic Review'.

Bibliographic coupling provides to a great extent the relationship between a set of research papers pertaining to a field. This will certainly help the information seekers in searching the document and to a certain extent help in classifying the information.

It would be possible for a researcher to cover the area of his interest more comprehensively and systematically by referring to research papers having high coupling strength. Coupling index may also come in handy to compile special bibliographic materials.

REFERENCES

1. FANO (R N). Documentation in Action. 1956. Reinholt; New York. pp. 238-44.
2. KESSLER (M M). Concerning some problems of inter science communication. 1958. Lincoln Lab. Group Report. pp. 35-45.
3. KESSLER (M M). An experimental study of bibliographic coupling between technical papers. *IEEE Trans. PTGIT IT-9*; 1963; 43.
4. KESSLER (M M). Comparison of the result of bibliographic coupling and analytic subject indexing. *Amer. Doc.* 16; 1965; 223-33.
5. MARTYN (J). Bibliographic coupling. *Jour. Doc.* 20; 1964; 236.
6. SEN (S K) and GAN (S K). A mathematical extension of the idea of bibliographic coupling and its applications. *Ann. Lib. Sci. Doc.* 30; 1983; 78-82.
7. SHARDA (B A) and SHARMA (J S). A study of bibliographic coupling in linguistic research. *Ann. Lib. Sci. Doc.* 40; 1993; 125-137.

RESEARCH TRENDS IN LIBRARY AND INFORMATION SCIENCE IN INDIA

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The analysis of trends of Ph.D. level research work in library and information science (LIS) and related topics in Indian universities since the award of first Ph.D. degree in 1950 showed that the years 1984-88 were the period of maximum growth in research, and the most popular subject had been Academic Libraries. The LIS Department of Karnataka University is the most productive school in the field. Suggests some measures to prevent possible dilution of research work in this subject.

INTRODUCTION

"Research is the only sure way to constantly expand the fund of human knowledge and solve the problems that face the mankind today" [1]. Research in the field of applied sciences and professional disciplines has an added significance, since through research they develop better and advanced tools and techniques for their works which ultimately lead to improvement in service to and living condition of human being. Being a developing profession, the library and information science (LIS) does not have a very long and inspiring research tradition. Librarians remained indifferent for long to research in their own profession despite the fact that they are the purveyors to researchers. Of late, the scenario has begun to change - thanks to social pressure and self-awareness [2]. While justifying offering of Ph.D. programmes in LIS, Wilkinson has rightly pointed out that "if librarianship aspires to become a profession, it

should depend upon research to develop its knowledge base and its theoretical framework" [3].

BACKDROP

Though LIS education in India started as early as in 1911, it was only after the World War II that it was gradually recognised as a full-fledged discipline and separate departments were set up in universities offering courses leading to bachelor and master degrees. This eventually set the stage for formal research activities in the subject. Informally, however, Ranganathan was single handedly conducting research in every sphere of LIS ever since he became the librarian of the Madras University Library. It was he who was responsible for instituting Master Degree and Ph.D. programmes for the first time in Delhi University with the active cooperation of Sir Maurice Gwyer, the then Vice-chancellor of Delhi University, in 1948 and 1950-51 respectively. At present, formal research in LIS is conducted at four levels, viz., M.L.I.Sc, M.Phil., Ph.D. and D. Litt. The research projects at M.L.I.Sc level aim at providing hands-on training in application of research methodology and involve elementary level of research work. The M.Phil. level research aims at advanced training in research methodology and is confined to only two universities, and D. Litt. has been awarded to only one candidate so far. Therefore, the dominant role in formal research in LIS is played by Ph.D. workers. The present study mainly covers the research work

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carried out at Ph.D. level, but includes also the lone D. Litt. work.

Ph.D. LEVEL WORK

Dr. D.B. Krishna Rao was the first person to be awarded a Ph.D. degree in LIS in 1957. He worked under the guidance of Dr. Ranganthan. It was after two decades that the second Ph.D. degree was awarded in the subject by Punjab University, after which research in LIS gradually picked up. Nevertheless, research in LIS related subjects started even earlier, in 1950, when Calcutta University awarded a Ph.D. degree in science to Minendranath Basu for his work relating to preservation of museum articles and library materials. Several Ph.D. degrees were awarded to other candidates on LIS related topics even during the lull that followed the award of the first Ph.D. degree in the subject. However, all such works were carried out in departments other than LIS and under the guidance of scholars belonging to other fields. Besides, some library personnel and LIS teachers have done research work leading to Ph.D. in LIS at universities abroad or Ph.D. on subjects other than LIS. Thus, there are four categories of research work conducted by Indian library personnel, including library workers and LIS teachers. These are

- i) research conducted in LIS schools in India on topics related to LIS or inter-disciplinary topics involving LIS;
- ii) research conducted in university departments in India, other than LIS departments on topics related to LIS or inter-disciplinary topics involving LIS;
- iii) research conducted in LIS schools abroad on topics related to LIS or inter-disciplinary topics involving LIS; and
- iv) research conducted in Indian universities on topics relating to subjects other than LIS.

Since the purpose of present study is to investigate trends of research in LIS in India, the last two categories of research work have been excluded from its purview.

COVERAGE AND DATA COLLECTION

As indicated earlier, the pace of research in LIS in India was quite slow till 1970s; but during the next decade, it accelerated considerably. For the present study, the whole period since 1950 has been divided into four convenient time intervals. These are the periods before 1979; 1979-1983; 1984-1988; and 1989-1993, the first one being of a longer period for obvious reasons. Prior to this work, some other studies on Ph.D. level research work in India have been conducted. These include

- i) a study conducted by Dev Raj Sharma in 1985 [4]. He analysed the trend from 1950 to 1985 which listed 53 theses for which doctorate degrees were awarded during the above period;
- ii) a bibliography of research in LIS compiled by Vijay Pathak and L.S. Ramaiah in 1986 [5] which covers 56 doctoral theses;
- iii) a bibliography compiled by P.S.G. Kumar in 1987 [6] that included 71 theses for award of doctoral degree. This bibliography included not only doctoral theses on LIS submitted to Indian universities, but also the theses of doctorate degrees by foreign universities;
- iv) a bibliography prepared by Dev Raj Sharma in 1990 [7] which lists 56 theses for which doctorate degree was awarded by Indian universities during 1985-1990; and
- v) a bibliography compiled by Dev Raj Sharma and D.K. Sharma in 1992 [8] listing 80 dissertations accepted by Indian universities for doctoral degree during 1990-1992.

In addition to above sources, data have also been collected from the University News; Herald of Library Science; ILA Newsletter; IASLIC Newsletter; IATLIS Newsletter; and UPLA Newsletter to ensure comprehensiveness in coverage.

GROWTH STUDY

The growth of Ph.D. level research in LIS in India may be observed in the following Table.

Table 1

Growth of Ph.D. level research in LIS

Year	No. of Ph.D.s	Year	No. of Ph.D.s
1950	1	1983	10
1957	1	1984	18
1963	1	1985	21
1966	1	1986	5
1972	2	1987	8
1973	1	1988	9
1977	4	1989	13
1978	3	1990	17
1979	2	1991	21
1980	4	1992	47
1981	4	1993	16
1982	3		
Total		212	

Note : The figure for 1992 includes one D Litt.

It is evident that research activities in the field of LIS were at a very low ebb till 1982. Only 28 Ph.D. degrees were awarded in 33 years. No degree was awarded during 1951-1956 and 1958-1962. Significantly, majority of these research works, at least 17, were conducted in departments other than LIS departments under the guidance of specialists in other subjects. The main reason was possibly non-existence of LIS departments and/or Ph.D. facili-

ties in LIS in many of the universities where research work was conducted. The number of Ph.D. degrees awarded reached the double figure in 1983 and since then, research activities maintained a regular rhythm till 1991 except a brief set back during 1986-88, the reason for which is difficult to guess. A great spurt was noticed in 1992 when as many as 47 degrees were awarded, the highest in a year so far. In 1993, the figure has again dropped to 16. It is possible that the information collected for that year may be incomplete. The study of growth that were achieved during the four time intervals mentioned earlier reveals that upto 1978, 14 degrees were awarded, which increased to 23 during 1979-83 registering a growth of 64 percent. The figure further increased to 61, during 1984-88, the growth rate increasing to 165 percent, and to 114 during 1989-93, the growth rate dropping to 87 percent. It is possible that when the full information for 1993 is available the rate may go up but certainly it is not expected to match the growth of previous period. Hence, the period 1984-88 may be termed as the period of maximum growth in the field of LIS research in India.

SUBJECT ANALYSIS

The analysis of the subjects on which researches have been conducted has been presented in Table 2. It shows that upto 1978 the most popular area of research was Library Movement/Library Legislation (7 theses); during 1979-83 it was Library Classification/Theasaurus (5 theses); during 1984-

Table 2

Subject-wise analysis

Sl.no.	Subject	Number of Ph.D.s (including one D. Litt.)				
		Before 1979	1979-83	1984-88	1989-93	Total
1.	Academic Libraries	1	3	10	15	29
2.	Archives			2		2
3.	Bibliometrics/Citation Studies			5	10	15
4.	Cataloguing				1	1

(Contd.)

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Table 2 (..Contd.)

Sl.no.	Subject	Number of Ph.D.s (including one D. Litt.)				
		Before 1979	1979-83	1984-88	1989-93	Total
5.	Children's Literature		1		1	2
6.	Classification/Thesaurus	2	5	2	2	11
7.	Indexing		1	5	5	11
8.	Knowledge/Communication				2	2
9.	Libraries/Information Centres (general)			2	2	4
10.	Library & Information Science Education			1	7	8
11.	Library & Information Services		2	4	6	
12.	Library & Information Systems	1	1	3	5	
13.	Library Automation/Computer Application			3	6	9
14.	Library Cooperation/Resource Sharing		1	1	2	4
15.	Library Management			3	1	4
16.	Library Movement/ Library Legislation	7	1	2	5	15
17.	Library Profession/ Library Professionals			1	5	6
18.	National Libraries			1	1	2
19.	Periodical Publications		1	1	2	4
20.	Personal Contribution				2	2
21.	Preservation		1	1	1	3
22.	Public Libraries	1	2	4	8	15
23.	Reference Sources/ Information Sources		4	5	5	14
24.	Special Libraries & Information Centres			2	6	8
25.	Universe of Subjects			1	2	3
26.	Users Studies/Use Studies	2	2	6	17	37
		14	23	61	114	212

88 Academic Libraries (10 theses); while during 1989-93, studies relating to users were the most popular topic of research with 17 theses. Research on Academic Libraries maintained a continuous upward growth trend from one thesis before 1979 to 3 during 1979-83; to 10 during 1984-88; and to 15 during 1989-93. User/Use studies was the subject of research in two cases each, upto 1978 and during 1979-83, but in subsequent periods it became the subject of research in 6 and 17 cases respectively. Public Libraries was taken as a topic of research in one case only before 1979, but it

received continuously increasing attention during the next three periods. During 1979-83 two persons worked on this subject; during 1984-88, 4 persons; and during 1989-93, 8 persons did so. Indexing on which Ph.D. level research began during 1979-83, became a popular topic during the subsequent periods (5 each). On Library Automation/Computer Application three persons worked for the first time during 1984-88, but it attracted 6 persons (i.e. double) during the subsequent period. On the other hand, topics relating to Classification/Thesaurus which became popular during

1979-83 (5 theses), after only two persons working during the previous period, lost its popularity during subsequent periods (2 theses each). On the whole the most popular subject for research in LIS has been Academic Libraries (29 theses), followed by User/Use Studies (27 theses); Bibliometrics/Citation Studies (15 theses); Public Libraries (15 theses); Library Movement/Library Legislation (15 the-

ses); Reference/Information sources (14 theses); Classification/Thesaurus (11 theses) and Indexing (11 theses).

LIS SCHOOLS' ROLE

The role played by different LIS schools in furthering research in LIS has been shown in Table 3.

Table 3

Quantitative analysis of research in LIS schools

LIS school	No. of Ph.D. degrees awarded				
	Before 1979	1979-83	1984-88	1989-93	Total
Karnataka University		5	9	9	23
Punjab University	2	1	11	3	17
Rajasthan University		3	6	8	17
Andhra University		2	2	10	14
Gulbarga university		1	3	9	13
Delhi University	1		2	6	9
Jiwaji University			2	7	9
Banaras Hindu university		1	5	2	8
Burdwan University			1	6	7
Poona University	1	1	2	3	7
Calcutta University	2	2	1		5
Vikram University		1		4	5**
Utkal University				5*	5
Calicut University				4	4
Jadavpur University				4	4
Other Schools & Subject Depts.				65	

Note : Schools here include non-LIS departments where researches have been conducted.

The table shows the details of only those schools which have produced at least four theses.

* The figure includes one D Litt degree.

** The figure includes 2 Ph.D. theses by one scholar.

The table indicates that though the LIS Department of Karnataka University initiated Ph.D. programme quite late during 1979-83, it has emerged as the most productive school in the country for research in the field with 23 Ph.D. degrees awarded till 1993. The other major schools in decreasing order of productivity are the LIS departments of Punjab and

Rajasthan University (17 degrees), Andhra University (14 degrees) and Gulbarga University ((13 degrees). Significantly, Delhi University which started Ph.D. programme in LIS for the first time in the country and also awarded the first Ph.D. degree in LIS and Calcutta University which awarded the first Ph.D. degree in science on a topic related

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to LIS are lagging far behind with 9 and 5 Ph.D. degrees respectively. Utkal University is the first and the only university to have awarded the highest degree of D. Litt. in LIS, while Punjab University awarded the highest number of Ph.D. degrees during any five year period in 1984-88

(11 degrees).

GUIDES' ROLE

The role of different guides as far as conducting the research in LIS has been shown in Table 4

Table 4

Research guides' contribution

Name of guide	No. of candidates guided	Name of guide	No. of candidates guided
S R Gunjal	14	K A Isaac	4
M R Kumbhar	12	M R Riswadkar	3
J S Sharma	10.5	S N Srivastava	3
C R Karsidappa	7	A Tejomurty	3
P B Barua	6	P Dhyani	3
P N Kaula	5	Guides with less than three candidates	66
K S Deshpande	6		
M Mahapatra	4.5	Candidates whose guides could not be verified and those who did Ph.D. without guide	47
K Siva Reddy	4		
S R Ijari	4		
S M Tripathi	6		
C D Sharma	4		
Total			212

Note : In case where a person has guided a candidate jointly with another guide, the number of candidate has been taken to be 0.5.

From the above table, it appears that as many as 99 theses have been submitted under the guidance of the first 17 guides. Remaining 66 theses have been submitted under the supervision of 56 guides. Prof. S.R. Gunjal is the most active research guide in the field of LIS followed by Late Prof. M.R. Kumbhar and J.S. Sharma. It may be noted here that many well-known teachers in LIS have guided only a few candidates, some even less than three. This may be due to their other assignments or to give more time to the respective candidates working under them.

CONCLUSION

The above study has clearly manifested the current trends in Ph.D. level research work in the field of LIS. It has shown that altogether 209 persons have been awarded 211 *Ph.D. degrees and one D Litt degree for their research work on various areas of LIS and related subjects till 1993 and research activities in the field are constantly on the rise. This is certainly an encouraging sign for any subject and more so, for an emerging profession like LIS. The recent spurt in Ph.D. level research work is often

*Two scholars has been awarded two Ph. D. degrees each.

attributed to the increasing importance being attached to this degree for the purpose of employment, the increasing self-consciousness among the library and information personnel and increased opportunity for Ph.D. work. While appreciating this trend, it needs to be ensured that this spurt does not result in any dilution of research work, but helps in further advancement of the subject and profession. To this end, the following measures may be taken.

1. Ph.D. programmes should be operated only in those LIS schools where necessary infrastructural facilities and competent guides are available.
2. The subjects chosen for research work should be of high standard which can genuinely lead to creation of new knowledge or new tools and techniques for effective library and information work.
3. The areas requiring special attention for research work should be identified and taken up for conducting research. The subject-wise analysis of Ph.D. theses shown above may be of help for this purpose.
4. The number of candidates to work under a guide should be limited. In some universities the limit is as high as 10 candidates, which is not helpful as it is not possible for one person to give equal attention to many candidates simultaneously.
5. Joint guidance should be encouraged for interdisciplinary subjects.
6. The wasteful research-in-parallel should be avoided by regular bibliographical control of Ph.D. theses in LIS accepted in different universities and/or exchange of information relat-

ing to on-going research projects between different LIS schools.

7. Strict quality control should be effected for awarding the degrees in the subject.

REFERENCES

1. SATIJA (M P). Garnering the fruits of research: sources of LIS dissertations. In KUMAR (P S G) and VASHISHTH (C P), Ed. Library and information science in India. 1992. Sterling; New Delhi. p. 99.
2. *Ibid.* p.100.
3. WILKINSON (John). The Legitimization of librarianship. *Libri.* 33; 1983; 39.
4. SHARMA (Dev Raj). Doctoral theses in library science. *Herald of Library Science.* 24; 1985; 62-67.
5. PATHAK (Vijay) and RAMAIAH (LS), comps. Bibliography of research in library and information science in India. 1986. I.D.S.; Gurgaon.
6. KUMAR (P S G). Ed. Research in library and information science in India : a bibliography of Ph.D., M.Phil and MLIS dissertations. 1987. Concept; New Delhi.
7. SHARMA (Dev Raj). Doctoral thesis in library and information science accepted by Indian universities (1985-1989). *CLIS observer.* 7; 1992; 39-43.
8. SHARMA (Dev Raj) and SHARMA (D K). Doctoral theses in library and information science accepted by Indian universities (1990-1992). *CLIS Observer.* 9; 1992; 39-45.

MARKETING PERSPECTIVE FOR INFORMATION SERVICES AND PRODUCTS IN INDIAN PETROLEUM INDUSTRY

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Discusses the importance of marketing approach in petroleum industry information services and products. Identifies information user groups, their needs and suggests few services and products along with pricing policies.

INTRODUCTION

Marketing approach to petroleum information services and products is distinct from many other information services and products because of secretive, cost intensive and authoritative nature of information. Marketing of information services of this industry, in principle and practice, needs immense care and judicious approach based on user oriented service.

Information marketing spans entire spectrum of private and public setting where the information service is provided [2]. Sweeping privatisation of global petroleum industry under present politico-economic philosophy has propelled all its constituent segments/ units to be economically viable and useful for their existence. Multidimensional role of information in petroleum industry's decision making demands effective marketing approach [1]. Targetted to put knowledge into work, library and information units (L&I) attached with the industry must now transform price free services to price based client oriented economic activity with all its implications. This implies active marketing of information products and services both within the parent organisation and outside which calls for

- i) cultural change i.e. internal publicizing the idea of marketing;
- ii) information market analysis and research for identifying petroleum information users' needs

and wants;

- iii) planning the marketing program;
- iv) total customer focus on services and product design and development;
- v) continuous improvement/modification in existing products and services and starting new ones;
- vi) achieving competitive edge over others through world class value added products and services;
- vii) integration of market planning with self sustained economic resource generation for the industry.

However, the L&I units dealing with intangible commodity of information available in various technological forms are faced with some common business realities such as, infrastructural obsolescence, antagonism towards pricing of erstwhile charge free services and products, users' apathy to pay for information for keeping updated, unpredictable customer needs/wants for information required, lack of trained marketing professional and retraining, and acquiring new brand of library professionals to ensure competence with appropriate marketing/selling skills.

This paper discusses how the information service delivery units of petroleum industry may endeavour to initiate implementation of information service marketing process and achieve results targeted to profit generation in the context of LIS promotional paradigm shift.

MARKETING VIS-A-VIS PROMOTION

Information marketing is the management process responsible for identifying the customers, commu-

nicating with customers, satisfying customers to meet the stated objectives and should have suitable policy to retain and expand the market with continuous advantages over the competitors. Promotion of Library and Information Services (LIS) is a complex management process of creating and maintaining awareness [3], provoking a desire for and the practice of satisfying the library readers' wants destined to attract users and increasing the use of services and products. Profit desired out of promotional activities of these services was so long educative only which had neither been put to measurement nor was possible to measure as in cases of other tangible commodities. Cost of these intangible services is paid by the parent organisation from budget overhead. The means that are used to promote library services are

- i) personal efforts of librarians and information professionals working in the library and information units; and
- ii) through activities performed in various other forms such as, brochures illustrating what the library and information unit can do for the users, direct mailing of new services to specialists, display and exhibition of services and products to draw the attention of the users, interpersonal communication with users about the library activities and so on.

Marketing circumscribes promotion and reveals strong conviction from user for better and high quality service when offered under the marketing setup [4]. It is tinged with business colour involving financial activities and stretches beyond the patronizing organization to invite more users. Successful marketing boosts the profile of the practicing unit in the eyes of management.

PETROLEUM INDUSTRY : INFORMATION USER GROUPS

The users of information market segment in petroleum industry can be grouped under two broad categories—upstream companies workforce and downstream companies workforce which can further be grouped as

- i) primary user groups who are already using the information products and services but need regular monitoring of their needs and wants to

provide them better services viz, Oil & Natural Gas Commission (ONGC), Indian Oil Corporation (IOL) and various other private owned exploration companies;

- ii) potential user groups whose information needs are directly related with the products and services but are neither receiving nor are aware of these services. Examples are mining, refining, marketing, pipeline, transportation, petrochemical groups and institutes for petroleum analysis and product development etc.; and
- iii) prospective user groups whose information needs are in some way or other related to information products and services of petroleum based industries but are not aware of it. Examples are geoscience departments in the universities, petroleum engineering departments, societies & associations, geological institutes etc. Such user groups need be explored for extending the information market.

These market segments/user groups are involved in varieties of activities such as,

- i) Exploration and production of petroleum and natural gas;
- ii) Refining and crude processing;
- iii) Natural gas processing, compression and transportation;
- iv) Marketing and transportation: import and indigenous marketing of crude oil and petroleum;
- v) Pipelines;
- vi) Petrochemicals;
- vii) Engineering and oil field equipment management;
- viii) Alternate energy sources;
- ix) Safety and environment management; and
- x) Petroleum legislation and policy.

MARKETING PLAN OF INFORMATION PRODUCTS/SERVICES IN PETROLEUM INDUSTRY

Marketing plan involves - product design, costing and pricing, place and mode of delivery, and product promotion. Development of proper market plan requires analysis of information needs and information seeking behaviour and availability of products and services. Precisely, it ensures what is to be done in each area of product life cycle [5].

MARKETING PERSPECTIVE FOR INFORMATION SERVICES AND PRODUCTS

Information Needs and Information Seeking Behaviour in Petroleum Industry

Information seeking behaviour is in response to variable stimulus—goal directed activities blocked by insufficient knowledge about information problem. Insufficient knowledge stimulates a person to express his information requirement. Information seeking behaviour in petroleum industry varies with the strata of work group.

Top management and corporate petroleum planners concentrate more on personal interaction with experts from giant petroleum companies, handouts, national and international seminars, conferences, discussion with visitors from different companies and consultants/advisors. Primary information sources in various forms and channels of communications form yet another important media of information access, besides the reports compiled and produced by the special group of experts attached locally.

Middle level managers have interaction with both the strata, above and below this group. Part of information is obtained from top strata and a part, from the experimental/field work performed by the bottom strata. Besides, the library and information unit is consulted for various primary and secondary information sources. Bottom line fully depends on the previous works, guidance from seniors and supervisors, varieties of retrieval tools etc.

Information needs of petroleum industry workforce fall in two major categories i.e. Lab/operation data and off lab available publicity data or fact. Laboratory/operations information comprises of basin geoscience; field/structure; well (exploratory, wildcat, dry, producing, and abandoned); geographic information; surveys/seismic prospecting (gravity, magnetic); geochemical prospecting; prospect evaluation; geological laboratory analysis/lithostratigraphy; reservoir and production; drilling equipments/technology and engineering aspects applied to various drilling production operations; petroleum engineering/geology - refining, lube extraction, petrochemicals, natural gas processing etc.

Library/information database comprising of geological/geophysical/geochemical information, foreign basin information, drilling information, reservoir and production information, management and

finance information, safety and environment information, refining, marketing, pipeline, transportation and petrochemicals information are normally used to meet the information requirement.

Information Services and Products

Petroleum industry library and information units provide information service to specialized groups of users. The structuring of these services may be categorised as function based, objective based, personalized client based, and form of material based structures. A set of services and products are devised and existing packages of information are repackaged to suite the specific requirements of existing and prospective users. Examples of some of the services which are/may be generated are

- i) Retrospective Search Service (RSS) from inhouse databases, CD-ROM and on-line information systems, for different outside organizations or in-house demands on price basis;
- ii) Current Awareness Service (CAS) of the new arrivals of reading materials segmented and packaged specifically for work force of different up stream and down stream sectors of the industry;
- iii) Automated Selective Dissemination of Information Service (ASDIS) personalised to meet specific need of the user community by maintaining a user profile and subject profile of all the sectors of the industry and running this profile bi-monthly against on-line search. It can provide information from world's leading databases;
- iv) Document Delivery Service (DDS/CAPPS) providing photocopies of the contents pages and author abstracts of the selected core titles of reference from the list of acquired journals on petroleum science and applied geosciences. The full papers from core journals selected by libraries may be provided on prices basis. The DDS may include supply of photocopies of research papers and references from CAS, RSS etc. on suitable price basis. Such services do not exist in petroleum industry and abounds strong marketing potential;
- v) CD-ROM Based Information Service (CDIS) for providing information service to petroleum

Pipeline Segment	Marketing Segment	Refining Segment	Exploration/ Exploitation Segment	Natural Gas Segment	Petrochemical Segment	Safety/ Environment/ Management Segment	Engineering Applications Segment
Information Seeking Behaviour			Industry	Information Needs			
Personal/group interaction Internal reports/records Meeting: formal/informal Mass media/attached TSG and MSG Visitors/experts agency advisors Product catalogue/handouts/bulletins of petroleum related companies Lab reports/records/ Meeting/seminars/conference Policy instructions On-line searches Information services/products Instruction manuals Supervisory instructions In-house training Vendor's documentation on tools/equipments Lib./information services			External information Corporate level	Corporate petroleum planning; Managerial economics; Discrete real time events on petroleum around the globe; Strategy and policy on petroleum; Operation and process; Geopolitics-global; Foreign based potential/ventures. Technology; Technique etc. Technical know-how; Geoscientific discoveries/innovations; Drilling operations/processes; Petroleum technology/science and engineering; Refining process; Marketing/transportation of petrochemical/natural gas; Geoscientific information; Financial /Manpower information.			
			Middle management				
			Bottom line Internal information	Equipment/lab related information; Material related information; Field work/operation site related information; Administrative procedures, rights and suites etc.			

Fig. Information needs and information seeking behaviour in petroleum industry

MARKETING PERSPECTIVE FOR INFORMATION SERVICES AND PRODUCTS

- industry as a whole by creating a subset of wider database available in CD-ROM. This may be basically a customized service beneficial to other segments of the industry; and
- vi) On-line Alert Service (OAS) exploiting the on-line databases to provide alert service according to the requirements of different segments and directly mailing the information to the users. This service would be a great economizer because the receiving end does not need any infrastructural backup. This may also be priced accordingly.

Information products can be designed from available data and information by a group of specialists such as, geo-scientists, petroleum technologists and information scientists by regularly monitoring the real information needs arising from technical jobs. Periodicity, mode of transmission and type of products are important factors. Product once developed needs constant feedback for modification requiring unpackaging, packaging and repackaging to match the concurrent needs.

Information needs and information seeking behaviour illustrated in the *fig.* with various interplay of each give rise to specific information products for petroleum industry. Such products may be abstracts/indexes/bibliographies on different aspects of petroleum exploration, production, refining, petrochemicals, transportation, marketing, geo-science, chemical physics, sedimentary basins, petroleum engineering and so on; electronically published inhouse publications with new features like industry focus, news and views, calendars and meetings, product briefs etc.; petroleum information on Afro-Asian regions; cumulative index of in house publication.

Pricing is about how to of charging for services [6]. Libraries/Information units must charge in order to offset the cost of acquisition, packaging and dissemination of information, various overhead costs-fixed and variable.

Many Indian institutions and government agencies e.g. Indian National Scientific Documentation Centre, Indian Institute of Science have already started pricing their information products and services. INSDOC generated more than Rupees one crore from external sources during the financial year 1993-94 by marketing its information services and

products [7]. Institutions in different developed countries have also started charging for services and products. Of course, pricing mechanism varies from institution to institution. Many institutions believe in charging out-of-pocket expenses while many others set their prices with a profit motive. The Petroleum Abstracts Inc., University of Tulsa charges different rates of Petroleum Abstracts from different petroleum companies depending upon the assets of the company. Pricing mechanism for different products/services offered by library group of petroleum industry is similar to special libraries who charge for their products and service in different ways, such as,

- i) charging back within the institution account;
- ii) charging out to customers who are buying institute's products and services, free so far, to offset the cost incurred. This refers to ILL of articles, retrospective searches, issues of bulletins;
- iii) selling directly to customers. This relates to software packages, information packages on optical discs, micrographic media for the outside customers; and
- iv) head counting [8] for library consultation and use by the outside organizations and individuals retired from the services of the industry.

Charging mechanism and formula for information products and services can be decided based on the cost of various resources input in generating the products and services and the profit target fixed up which need not necessarily be adopted on the pattern of other institutions. Initial rates may be loose and tentative subject to revision on actual feedback and demand of the product in the market. The pricing mechanism must also consider the competitive edges and demand of the product or service.

INFORMATION MARKETING IMPLEMENTATION PROCESS

To obtain necessary support for marketing program library/information units of the industry need to sell first to the industry the benefits of information services and products.

Beginning with middle level executives from different segments visiting library, conducting one to one personal informal meeting to present the idea

and getting their views are of immense importance in marketing. Discussions with middle level executives percolate up and down to bottom line employees and serve as a spontaneous mechanism for the personnel to accept the marketing concept with less resistance. During these meetings concept of marketing system and pricing mechanism may be talked about. After setting the initial view about resource generation for the industry facing resource crunch, the discussion may be relegated towards pricing from outside sister concerns and then, a cursory touch regarding paying back out of pocket expenses from within the organization can be put forth. Views of the discussion group regarding nature of changes in the present set up in relation to the effectiveness of existing services/products and ways to improve upon can give real picture about their requirement and the way they need it.

Petroleum industry libraries possess strong marketing potential. It has information stock on shelf, convertible to information stock on trade. Motivating and attracting more and more users by transformation of traditional professional activities into economic activity by structuring (packaging, unpackaging and repackaging into customized formats) and delivering the products to customers (erstwhile users) are the essence of marketing. It must ensure sustaining the present client, generate more demand from the existing clients and attract new clients by creating the benefits notion from the services and products.

CONCLUSION

Marketing is a complex process wherein entire organization's involvement is essential for its successful implementation. Customer centered petroleum information services and products need ever increasing attempts for innovative techniques and exploit advantages of information technology for exhaustive and personalized need based approach in designing, developing, delivery mechanism and communication channels. Constant monitoring, and feedback from users could provide the basis for packaging and repackaging the information.

Libraries and information units so far have only been spending but not making any earning for the

organization to whom these are attached with. The existing information products and services need to be reformed and repackaged in tune with the need and marketed to sister concerns and also to outside organizations of similar nature in Asian and Afro Asian region. All the promotional activities should be looked into with the profit motive for the organization. Librarians and information workers in petroleum industry have to give a relook to their present day activities and bring in professionalism in their attitude with a blend of marketing approach. Libraries must strive to generate resources for their sustenance and contribute to the organizations treasure through marketing of its services and products.

REFERENCES

1. GHOSH (S B). Marketing of information services and products and its components. *Workshop on marketing of information services and products, Calcutta, Feb 28-March 11, 1994*. IASLIC; Calcutta. p1.
2. *Op cit*.
3. MACARTHY (Grace). Promoting the inhouse library. *Aslib Proc.* 44, 7/8; 1992; 290.
4. COOTE (Helen). Marketing matters to you, your staff and your customer. *Aslib Proc.* 45; 1993; 9.
5. GHOSH (S B). Planning the marketing program. *Workshop on marketing of information services and products, Calcutta, Feb. 28 - March 11, 1994*. IASLIC; Calcutta. p 4.
6. WARNER (Alice Sizer). Making money: fee for information service. *Spec. Lib.* 789, 4; 1987; 279.
7. VISWANATHAN (T). Valedictory address at workshop on marketing of information services and products. Calcutta, Feb. 28-Mar. 11, 1994. IASLIC; Calcutta.
8. BRINDLEY (L J). Information service and Information product pricing. *Aslib Proc.* 45, 11-12; 1993; 297-305.

UGC-CDC RECOMMENDATIONS ON CURRICULUM DEVELOPMENT IN LIBRARY AND INFORMATION SCIENCE, 1993 - A REVIEW

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The observations and recommendations arising from different seminars and committee reports including the role of the University Grants Commission (UGC) in Library & Information Science (LISc) education are noted. Critically examines various recommendations of the UGC Curriculum Development Committee (CDC) in LISc (1993) in the context of the experiences of the Department of Library and Information Science at Vidyasagar University, Midnapore and suggestions for their implementation are offered. Modular curriculum has been proposed as an alternative to the master plan recommended by the CDC.

INTRODUCTION

On November 3, 1952, the Government of India resolved to create a University Grants Commission (UGC) in pursuance of the recommendations of the University Education Commission (1948-49). Since the enactment of the UGC Act by the Parliament in 1956, the UGC has been functioning as an autonomous and statutory body. The existence of a body like the UGC has significance for the development of higher education in the country in many respects. The development, promotion and maintenance of standards in institutions of higher education and research are stated to be the central responsibility of the UGC. The section 12 of the UGC Act, 1956 stipulated that "It shall be the general duty of the Commission to take, in consultation with the universities or other bodies concerned, all such steps as it may think fit for the promotion and coordination of university education and for the determination and maintenance of standards of teaching, examination and research in universities" [5].

In terms of the above provision, the main objective of the UGC should be to raise the level of university education to the highest standard in the country.

In the area of library and information science, the first effort was made by UGC, when it appointed a Library Committee in 1957 under the Chairmanship of Dr. S.R. Ranganathan [12]. One chapter of the report was devoted to library science education. Realizing the need for larger number of trained library personnel in the country and the need for maintenance of quality of training, a Review Committee on Library Science was appointed by the UGC in 1961 again under the Chairmanship of Dr. Ranganathan. The Committee in its report laid down for the first time in the country a detailed pattern for Library and Information Science (LISc) education [15]. Apart from these reports, efforts for developing of standard pattern for LISc education are also evident from the recommendations of UGC Panel on Library and Information Science appointed in 1979 and 1982 respectively.

LISc EDUCATION AND CURRICULUM

Recognition of the role of information as a vital input for development necessitates an adequate library and information infrastructure for the efficient and effective functioning of a national development system. Such a structure requires sufficient professionals with quality to plan, design, organise, manage and operate a wide range of libraries and information centres in the country. LISc is a professional education like medicine, law, engineering, etc., aimed to develop the educands with adequate knowledge and skills for secondary

information work and services at different levels. To achieve the objectives, the LISc departments of universities conduct courses leading to Bachelors (BLISc), Masters (MLISc), M Phil and Doctoral degrees for professionals.

It is felt that the existing pattern of LISc education in India should be able to meet the challenges of economic, scientific, technological, social and educational needs of the country. In the context of the current and likely future developments in library and information services, more emphasis on information technology including library automation in the curriculum of library schools, with necessary hardware and software facilities are required, keeping in view the fact that India cannot completely do away with traditional libraries and go for allround latest technologies adopted by the advanced countries of the world. Hence, there should not be a major deviation from the traditional pattern of papers and course contents. In spite of numerous papers written on LISc education, discussions in seminars and the recommendations in the reports of various committees and commissions, a number of problems relating to the curriculum in LISc still remains unsolved. A curriculum is defined as "..... the outcome of many interactions and search for agreement among various experts and it results almost inevitably in endless debates" [6]. But, a debate can not be a substitute for a decision.

CURRICULUM DEVELOPMENT COMMITTEE (CDC) IN LISc

On the recommendations of the Panel of LISc, UGC constituted a CDC in LISc in 1990 under the Chairmanship of Prof. P.N. Kaula with the following objectives [13]:

- i) to examine the existing curriculum in LISc of different universities in term of quality as well as the workload;
- ii) to examine how the new curriculum would meet manpower needs of information centres in the modern age in the light of national development;
- iii) to devise a model curriculum which will be relevant to the requirements of the country;
- iv) to suggest the textual material needed to follow the new curriculum;

- v) to suggest ways and means of preparing text books, teaching aids, library as well as laboratory requirements in implementing the proposed curriculum; and
- iv) to suggest orientation programme for teachers in order to impart instruction according to the revised curriculum.

It was envisaged that this endeavour of CDC would be able to offer a generally uniform pattern of LISc education in the country which in turn may facilitate the mobility of students from one region to other.

OPERATIONAL STAGES OF CDC

Questionnaires along with the guidelines were circulated to 69 university departments of LISc with the request to send their existing syllabi and to associate their faculty members in the process of identifying suggestions as per the prescribed proforma. But, a very poor response was received by the CDC (only 24 departments responded to the questionnaire).

Five meetings of CDC were held between 1990 and 1992 and apart from CDC members, 11 persons representing different universities and information centres attended the meetings as special invitees. A workshop was also organised on February 12, 1991 in the UGC office to debate upon the various issues relating to the curriculum design. After analysis of existing syllabi in LISc and on the basis of the working documents prepared by the subject experts, the possible areas of the subjects were identified under core and elective papers and the detailed draft syllabi were invited from the experts for each paper. While doing this, curricula of Sheffield University and Indira Gandhi National Open University (IGNOU) and curricula as suggested by Prof. F.W. Lancaster, Prof. A. neelameghan, Prof. G. Bhattacharyya and Prof. S. Parthasarathy were taken as feedback.

The CDC in its fifth and final meeting held on 13-19 January 1992 evolved the model syllabi after debating on the draft syllabi received from the different experts. The report of the CDC accompanying the model syllabi was submitted to UGC for its consideration and published in 1993 [13].

UGC-CDC RECOMMENDATIONS ON CURRICULUM DEVELOPMENT

RECOMMENDATIONS OF CDC : CRITICAL OBSERVATIONS

A critical analysis of the CDC's recommendations on the different aspects having bearing on the development of curriculum are presented in the following sections.

Levels of Courses

The two streams of professional education in LISc, viz, Academic (Professional) and Professional specialization have been reported to be evident in India. Under the former, seven levels of education have been identified in which BLISc (Post degree courses), MLISc, M Phil and Ph D are conducted by the universities. In the later stream, four courses- Certificate, Diploma, Associateship, and Fellowship imparted by the professional associations, autonomous institutions and deemed universities have been identified. Diploma course appears under both the streams, the reasons of which have not been stated in definite terms. The basis of grouping the courses under the two streams is not indicated. M Sc course in Information Science (2 years) conducted by the Birla Institute of Technology, Ranchi has not been included in the report. However, the following courses in LISc have been suggested by the CDC :

- (a) M Tech in LISc (incorporating technologies like computers, non-book materials and e-mail);
- (b) Master in Information Science;
- (c) B Tech in LISc;
- (d) M Lib Sc should be research based;
- (e) MLISc integrated course of two years, launching of which is optional to universities, for example, the CDC report [13, p.19] mentions that a two year part-time MLISc programme is conducted by Calcutta University. (This is not the integrated course since a separate one year BLISc programme is conducted there); and
- (f) BLISc programme in selected colleges.

From the above, it appears that the CDC is of opinion that university departments be exempted from launching the BLISc programme. But, in view of the infrastructural conditions prevailing in the colleges, this suggestion does not seem to be proper.

Admission Policy

The CDC has suggested

- i) to reserve seats for deputed candidates and Certificate holders in library science;
- ii) to give weightage to post-graduate degree holders with equal and proportional weightage to all disciplines;
- iii) admission test and interview as the criteria for selecting the candidate;
- iv) to restrict the number of admission to 1:5 teacher-student ratio; and
- v) either Master of Library & Information Science or Associateship program of two years duration should be the academic requirement for admission of the Ph.D. But the question of recognition of the Associateship program of INSDOC/DRTC as equivalent to MLISc degree is a long debated issue and a section of universities are reluctant in admitting the students having ADISc/AISc into their Ph. D. programme. Time has come to give serious thought on this aspect by the professionals. Number of intake of students at different levels needs to be looked into.

Medium of Instruction

English has been suggested by CDC as medium of instruction at university level of courses in particular. The regional languages needs to be considered as the medium of instruction at the BLISc level.

Teaching Staff

The CDC reiterates the recommendations of UGC Panel on LISc (1982) in respect of minimum number of teaching posts - i.e. five teachers for a department running only BLISc course - one Professor, one Reader and three Lecturers and eight teachers for a Department running both BLISc and MLISc courses - one Professor, two Readers and five Lecturers. But the CDC report is silent about the departments running M Phil courses. Inspite of the repeated recommendations made by the Library Committee [12] and the Review Committee on Library Science [15] both of the UGC, it has remained a distant goal for LISc schools in India to get the minimum number of teaching staff. It is quite

likely that the CDC report in this respect will not bring any change in the existing situation as happened earlier.

The rapid rate of technological development in the field of secondary information work and services necessitates that teachers having the knowledge of different aspects of Information Technology (IT) are to be recruited. The CDC reiterates this view by recommending the creation of additional teaching posts for the emerging areas like computer applications, informetrics/bibliometrics, reprography and micrographics, etc., but it is difficult to find adequate number persons for appointment as teachers in these areas. The experience at Vidyasagar University in this regard is not encouraging. At present, this problem can best be solved by inviting experts in these areas for lectures and demonstration and by appointment of part time lecturers and at the same time, by taking care of building the future professionals in this area. They have the advantage of bringing current practical experience into the class room and thus ensuring a firm link between the academician and practitioner, between theory and practice. The CDC has recommended such appointment. This method has been successfully implemented at Vidyasagar University and a very effective feedback from the students have been received. A multi-disciplinary area like LISc could often benefit from inter-departmental cooperation and in Vidyasagar University such cooperation are availed of from Physics, Statistics departments by employing their faculty members as guest teachers. Similarly, assistance from the depts. like Computer Science, Linguistics, Sociology, Psychology may also be sought for.

Orientation Programme for Teachers

For updating the professional competence of the existing teachers in LISc, the CDC has suggested organisation of different types of short-term courses and also deputation of teachers to advanced level courses of longer duration in and outside the country and giving them appropriate incentives.

As a matter of fact, the teaching in many of the department of LISc is based on the knowledge acquired by the faculty members several years ago. The following constraints for continuing education programmes [10] in respect of librarians are equally applicable for teachers in LISc:

- (i) human inactiveness;
- (ii) human ignorance;
- (iii) lack of motivation towards knowledge acquisition;
- (iv) psychological complexes towards attending formal courses;
- (v) attitude of management;
- (vi) financial constraints; and
- (vii) duration, date and timing of the course
- (viii) distance

A better course of action in overcoming the constraints would be to provide the means of promotion for those teachers who will attend the orientation programme. The Faculty Improvement Programme (FIP) meant for college lectures should also be extended to LISc teachers in the universities as a special case.

Teaching Methods

The CDC has suggested use of the following teaching methods in LISc :

- i) Lecture Method
- ii) Seminar Method
- iii) Group Discussion Method
- iv) Case-study Method
- v) Project Method
- vi) Tutorial Work
- vii) Learning-by-doing, i.e. "Hands-on" Experiences
- viii) Development of computer simulations. In order to implement the suggested teaching methods, it is imperative to have minimum infrastructure for the department.

Teaching Aids

Apart from black-board, the use of new teaching aids like overhead projector, slide projector (with synchroniser), AV equipment, PCs, etc. have been suggested to make the teaching-learning process more effective.

Library

The CDC report has provided the guidelines for the development of the departmental collection in LISc to provide basic and supplementary materials for course instruction. But, this guideline is not enough in the context of requirements of the De-

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partment of LISc. Many subjects in BLISc and MLISc require students to use libraries intensively to gain practical hands-on experience by using these libraries. Thus, such libraries in the Department of LISc can also serve the purpose of workshop for their students as an alternative to real work situation during their training period.

Such a library cum workshop in the Department of LISc at Vidyasagar University has been set up. This is being developed not merely as a traditional departmental library, but for shaping it as a model miniature library with the active participation by the students, supported by various models useful for demonstration.

Workshop cum Information Processing Laboratory

The professional course like LISc is a "theory-based and practice-oriented course" [1]. Students are required to acquire the knowledge of different tools and techniques and their associated technologies relating to secondary information work and services. The LISc students should be made skilled through the repeated performance of the library routine work besides other practical work. The workshop/laboratory is a place providing such opportunities for experimentation, observation and practice relating to the courses of study. Accordingly, the CDC has recommended to set up a workshop cum Information Processing Laboratory for each LISc department and has identified different units for the proposed laboratory.

Though it is a reality, yet it is often forgotten. The main problem concerning the development of an independent laboratory is of adequate financial support under the head of "purchase of laboratory equipment" for the LISc department. The experience at Vidyasagar University has been that the teachers of other depts were hesitant and even not ready to accept the concept of "Laboratory" in a subject like LISc (i.e. as Lab-based subject). A lot of difficulties are faced while getting allocated funds for the Workshop and laboratory. As a matter of fact, the Department of LISc of Vidyasagar University has been one of the few departments which took a lead in establishing a Workshop cum Library and IT Laboratory for their students and research scholars. What is wanted in implement-

ing such a programme is not merely to put the recommendations for consideration, but to provide fund for the same. Hence CDC's recommendation that the UGC should "Issue guidelines to Universities to treat LISc department along with science departments for allocation of equipment grants" and provide "lumpsum grant to each Department of LISc for acquiring basic equipment" is note worthy.

Internship Programme

The programme relates to theoretical knowledge of LISc to put into practice. Taking note of the prevailing practices and possibilities, CDC has recommended an internship programmes of 1-3 months at BLISc level on compulsory basis. Though a worthwhile suggestion, the problem arises in finding the suitable place of work. Post-course internship programme for BLISc students was prevailing at Vidyasagar University Central Library for last five years. But this practice has been discontinued from this year because of the paucity of fund and the indifferent attitude of the university authorities, perhaps, due to traditional concept about the LISc education. As an alternative, now the students are given practical training during the course at the departmental Library cum Workshop which appears to be pragmatic and effective one. Like engineering and medical education, it is absolutely necessary that workshop and laboratories be made compulsion, while opening LISc department.

Educational Tour

The CDC has recommended to include the educational tour in the curriculum. To make the tour more effective, it is essential that each student must submit a report on the workings of the information centre (s)/libraries visited together with an indication of their inadequacies and recommendations for their improvement. Some marks may be allocated for the purposes. Attending seminars/conferences may also be considered as educational tour.

Accreditation Agency

Though formation of an accreditation agency for LISc courses in our country has been felt for long time for inspecting and approving implementation of standards in allotment of subjects and maintaining

of standards in teaching of LISc at different levels' [9], it could not be materialised because of the very autonomous character of the universities. While emphasizing the need for developing such an agency, CDC has recommended a 'midway between *not at all having* an accreditation agency and *having* a compulsory authoritative accrediting body'. It would be optional to the universities to utilise the services of the accreditation agency. Universities may utilise their advisory services for the improvement of LISc courses. According to the CDC, Indian Library Association (ILA) or Association of Indian Universities should be persuaded to develop such an agency. This recommendation of CDC calls for urgent action and all national professional bodies must come and work together for formation of an accreditation agency which may otherwise immensely harm the LISc education of the country. This accreditation agency may be formed on the line of All India Council for Technical Education (AICTE), responsible for technical and management courses.

CURRICULA

CDC has suggested the curricula and guidelines for the different levels of courses in LISc like, BLISc, MLISc (one year and two year integrated courses), M Phil and Ph D. General objectives of the courses in different levels and specific objectives to be achieved by each paper have been laid down by the CDC. Bibliographies are also appended to each of the papers.

Core and elective/optional papers have been suggested both at the level of BLISc and MLISc. According to the CDC, core papers lead to basic required knowledge of the fundamentals of theory and practice in the subject. A wide choice of elective/optional papers from a variety of subjects at both the levels will offer an opportunity for faculty and students to pursue studies in area of special interest leading to a high degree of specialization. It is difficult to offer precise guidelines on the balance between core and elective papers. Different views of the seminars and subject experts, reveal that it does not provide for a uniform pattern for core and optional papers at MLISc level [8]. The choice of core papers requires to be uniform in all the LIS departments. The choice of elective courses for any particular department is closely related with both to its infrastructural facilities (es-

pecially availability of teachers having knowledge and skill in the subject areas) and its local needs. These may be introduced gradually when facilities and research programme grow [13]. The contents of each of the courses as suggested by the CDC are reviewed in the succeeding sections.

BLISc Course

The outline of the papers (both core and electives) to be taught at BLISc course is given in the Appendix I. Wherein six papers as core and sixteen paper (out of which two of 50 marks each are to be taken) as electives have been suggested. Hence, the BLISc course will cover a total of 700 marks. The observations relating to the details of the course contents and alongwith the suggestions are detailed below :

- i) Sessional works (with the provision for marks) indicating the nature of works to be carried out has not been provided, although the CDC is of opinion of conducting periodical examination/evaluation system on a set of units with the provision for scoring marks. It is suggested that library survey/users study and case study may be included as sessional works in the core papers I (Library & Information Society) and II (Library and Information Management) respectively.
- ii) In paper III (core paper), methodology of teaching classification (practice) are not provided in the report. To equip the students with proper practicals it is necessary that class numbers constructed for the examples throughout the session for classification practice are arranged according to filing order of the given scheme (s) for submission at the end of the session. Steps in classification are to be illustrated for each example. Some marks should be allocated for this purpose.
- iii) In paper IV (core paper), students are expected to study and understand only the theoretical aspect of subject indexing. It is now well recognised that a proper balance needs to be maintained between theoretical and practical teaching. Thus, the theory must be supplemented by the use of graded examples on practice, as suggested for library classification (practice) in paper III.
- iv) Paper V (core paper) has correctly made the provision for practice in respect of study and

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evaluation of reference sources and finding out information from them. In this context it is to be noted that the primary concern of a professional in the field of different sources of information and services is predominantly pertained to a subject or a group of subjects with which he may not be familiar. This calls for necessity of sufficient knowledge about the systematic method of study of subject and skill for applying this knowledge. This is equally true for secondary information work and services [2,3,7]. In view of this, there should be a topic/paper (core) on "study of subject" wherein each student should be required to undertake a project work on this aspect on a micro subject, which should comprise of identifying the different sources of information and preparing a bibliography of sources on the subject. This may be extended for the practical work of paper IV on library cataloguing and subject indexing. The experiment with this methodology at Vidyasagar University proved to be more effective to gain confidence to the students in doing such a project work on an unfamiliar subject. The LISc departments of Jadavpur University, Rabindra Bharati University and Kalyani University have also incorporated this methodology of work in their BLISc courses.

MLISc Course (one year programme)

The outline of the paper is given in Appendix II. Here, the CDC has suggested five papers and two elective papers (out of six) of 100 marks each and thus, covering a total of 700 marks. The observations and suggestions relating to the course contents (core papers) are :

- (i) In paper I (Information and Communication : Evolution and Development), Study of subject for secondary information work and services has also been included. In the context of this paper, the systematic study of subjects adopting appropriate methodology will help the students in understanding the theoretical foundation of the structure and attributes of the universe of subject. One of the objectives of this paper would be "to familiarize students with the methodology of study of subject". A proper methodology in this respect needs to be spelt out. Similarly, "Economics and Marketing of Information" is an important topic which is missing in the syllabus and requires to be included in the Paper I.
- (ii) There is repetition of the topic "Library and Information Policy", in paper I and II respectively. Paper I is the proper place for this topic.
- (iii) The basic idea about scope, areas of application and some essential components of Information Technology (IT) like, AV technologies, optical storage technology, and related telecommunication technology with reference to microwave, gateways, switching systems, etc., e-mail, teleconferencing are not in the syllabus and needs incorporation in Paper III (Computer Technology, Library Automation & Information System) to build up proper insight of the technology.
- (iv) There is no provision for practicals in paper III. Here, students are required to use processors and information retrieval software packages and to write a simple program. This will enable the students an understanding of library automation and methods of designing an information system. This practice has been adopted at Vidyasagar University.
- (v) Topics like MARC, UNIMARC and CCF should be taught in paper IV under "Descriptive Indexing". By taking away these topics from paper III, new developments like Artificial Intelligence including Natural Language Processing and Expert System can be incorporated. An elective paper "Artificial Intelligence in Library and Information Work" may be added to the existing list of elective papers in MLISc course.
- (vi) No practicals have been provided in paper IV (Information Processing & Retrieval). Objectives stated under this paper cannot be achieved without practicals. For this paper, students should be required to design a depth version of CC and a thesaurus on a subject selected in Paper I for Study of Subject. This method has been adopted as sessional work for "Information Processing and Retrieval" paper in the MLISc course at Vidyasagar University which is quite successful.
- (vii) Methods of evaluation of an information retrieval (IR) system is an important aspect and needs to be taught at Masters level along with some important IR experiments.
- (viii) A paper "Dissertation" in the MLISc course needs consideration. However, if a university

offers M Phil programme, dissertation may be dropped from MLISc course and be introduced in M Phil. In addition inclusion of following three elective papers is recommended in CDC list : Telecommunication & Networking, Business Information System and Industrial Information System.

MLISc Course (Two Year Integrated Programme)

The outline of the core and elective papers is given in Appendix III. Total nine papers have been suggested as core papers in which five papers (Paper I to V) to be taught in the 1st year and four papers (Papers VI to IX) in the 2nd year. The CDC has suggested to take the syllabus of Papers I and IV of 1st year from the BLISc Course module and the syllabus of paper III of 1st year and VI and VII of 2nd year from the MLISc course module (one year course).

Twenty optional papers are provided under two groups: ten papers under Group A and ten papers for Group B to make a choice of two of 100 marks each. Syllabus of these optional papers are similar as outlined in BLISc and MLISc (one year) courses. Thus, two year integrated MLISc Course comprises of a total of 1100 marks.

Some of the observations relating to the course are

- (i) The course for MLISc is to be spread over two academic years.
- (ii) There is repetition of the database associated concepts like use of DBMS packages which include CDS/ISIS, D-Base, etc. in Papers V and VIII which should have been included in Paper VIII only. It seems to be printing error in text arrangement in between papers V and VIII. Types of Information services are also absent in Paper V.

M Phil Programme

The CDC has recommended four papers (Appendix IV) without any provision for optional papers. It is felt that a core paper on Education in LISc should be introduced in the M Phil course in view of the fact that the said course requires emphasis not only on research but also on the education in LISc.

Basically, students will have to do the similar work for the Papers II (Current trends in LISc) and III (Literature Survey) and hence, these two papers may be merged into one paper.

The CDC has not suggested the duration of M Phil programme. It is felt that this should be of one and half year duration in which six months may be for project and dissertation work. There may be five papers including dissertation/term paper.

Ph D Programme

The CDC has provided the guidelines and areas of research in LISc. The need for Post-doctoral programme in LISc has also been felt. However, the departments should be careful in selecting the topics for research and candidates for admission into the programme. Local problems should get priority in selecting the topics of research.

It has been reported in the workshop on CDC report on LISc held on 19.3.93 in the UGC office that the Central Government has in principle agreed to create a "Centre for Research in LISc". It is the crying need of the time and the professionals must come together to insist upon the Central Government in the matter.

Special Courses

The CDC has also recommended for organisation of special courses on the recent advances in the sub-topics of the core subjects as well as electives of BLISc and MLISc programme. In addition, CDC has also provided a list of 38 subjects on which the special courses may be organised.

EXAMINATION REFORM

The UGC has been emphasising the examination reform programme realising the fact that the examination reform and curriculum reform are closely related. The main emphasis relating to the examination reform programme is on the continuous sessional evaluation as a supplement to the final examination. The UGC has suggested the following minimum examination reform [11] :

- (a) The syllabus in each paper should be demarcated into well defined units/areas of content along with topic wise breakdown. In this con-

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text, it is to be noted here that the CDC fails to incorporate this concept into the model curriculum in spite of accepting this in principle.

- (b) There should not be very wide choice for answering questions in the examination. Choice may be given to students by providing alternative questions in each unit of the syllabus.
- (c) Examiners should be free to repeat questions set in a previous examination in order to ensure that students do not leave any important portion of the syllabus.

The aforesaid suggestions of the UGC should become part of the model curricula and require to be implemented with a view to raise the standards of LISc education.

MODULAR CURRICULUM - AN ALTERNATIVE

The design of curricula for a dynamic inter-disciplinary subject like LISc raises awkward questions about the inclusion or exclusion of particular topics and the emphasis to be given to individual topics. The modular curriculum can solve the problem [6]. Such curriculum is not intended to match in detail the specific requirement of any particular LISc department. Each department has its own organisational framework which is particular to itself. As for the contents of the course one has yet to find two universities in India having identical curricula or common objectives. Hence, rather than functioning as some kind of master plan for a curriculum, the modules can be used as a basis from which an actual curriculum can be designed, keeping in view the local conditions and needs. The modular structure of curriculum also facilitates the modifications and exclusion of parts of modules or even entire modules from the curriculum. Here, "each of the modules is given a weightage expressed in 'credits' which indicates the relative time to be devoted to the content of each module within the overall programme. Any department of LISc can use a particular credit rating structure for its own programme" [6].

CONCLUSION

It is very important to note that the ultimate authority for the implementation of the recommendations of the CDC rests with the universities. Suggestions advanced in the CDC report for standardising the

LISc education may not be practicable at the moment since all the departments in LISc do not have adequate resources for maintaining a high standard. There has also taken place an unplanned proliferation of library schools in the country with the result that the number of sub-viable LISc departments has gone up and little or no attention has been paid to the consolidation of facilities in the department. There is also a resistance to change and innovation in the name of autonomy and academic freedom by a section of teachers.

The UGC has made several recommendations in respect of the improvement of curricula and restructuring of courses, but little is done to implement them. The UGC has not as yet carried out any formal inspection of a department (certainly after consultation with a university) for the purpose of ascertaining its standards of teaching, examination and research as required under section 13 (1) of the UGC Act, nor has it exercised the power under section 14 for withholding grants on account of not complying with any recommendations made by the UGC under sections 12 and 13. Hence, it would almost appear that the 'UGC has been a silent spectator of the chaos taking place in LISc education'. The Review Committee on UGC programmes was in agreement with the above view and suggested to use the powers given to the UGC under the Act as a last resort [14]. At the same time, UGC must come forward with necessary resources in respect of proper infrastructural facilities for the LISc departments. It would also be necessary for the UGC to persuade the universities to establish academic planning, evaluation and implementation boards to improve the academic standards.

The very size and complexity of the system of higher education in India indicate that the tasks of maintaining academic standards require an intensive and collaborative effort by various agencies, viz., Central Government, State Government, UGC, university administration, library and information professionals, teachers and students. All these agencies should work together to create a desired pattern of LISc education in India. Otherwise, the problems relating to LISc education will remain unsolved.

It is understood that the UGC has reconstituted the panel of LISc for a term of two years w.e.f. 1.6.94 to review the teaching and research

programme in LISc and to make recommendations for further improvement [4]. The panel must make a provision for feedback channel so that the criticisms and suggestions on the various issues of the recommendations of the CDC emanating at all levels in the country are collected and discussed while making recommendations for improvements of LISc education in the country.

REFERENCES

1. BASU (Asok). Designing of library and information science curriculum: a social need. paper presented in the seminar on 'Contents of education in librarianship', Department of Library Science, Calcutta University, May 6, 1992. (Mimeograph).
2. BHATTACHARYYA (G). Methodology of studying subjects for information work and service: an essential component of information science. *DRTC Annual Seminar*. 21; 1984; Paper BA.
3. BHATTACHARYYA (G). Project on study of subjects. *Library science*. 12; 1975; Paper G.
4. IASLIC Newsletter, July-August, 1994.
5. The University Grants Commission Act, 1956, as amended upto 17th June, 1972.
6. LARGE (J A). A modular curriculum in information studies. 1987. Unesco; Paris. (PG 9-87/WS/5).
7. MOOKHERJEE (B P) and SINHA (M P). Study of subjects: provision at the different levels of library science education - some experiments. *DRTC Annual Seminar*. 10, Pt. 1; 1972; Paper AF.
8. REDDY (K Siva) and RAJU (G V S L Narasimha). M LIB Sc syllabus: core and optional courses. *DRTC Annual Seminar*. 10, Pt. 1; 1972; Paper AD.
9. ROY (P B). Library and library science education in educational development. ILA Seminar on New Education Policy Vis-a-Vis Library Development, February 13, 1986. p 43-50.
10. SEETHARAMA (S) and GOPINATH (M A). Continuing education programme for librarians: its needs and methods. *DRTC Annual Seminar*. 10, Pt. 1; 1972; Paper AR.
11. UNIVERSITY Grants Commission (India). Guidelines regarding the minimum number of actual teaching days, programme of examination reform and workload for teachers in universities and colleges. 1989.
12. UNIVERSITY Grants Commission (India). Library Committee. Report of university and college libraries (1959). 1965.
13. UNIVERSITY Grants Commission (India). Report of the Curriculum Development Committee in Library and Information Science. 1993.
14. UNIVERSITY Grants Commission (India). Report of the Review Committee on UGC programmes. 1981.
15. UNIVERSITY Grants Commission (India). Review Committee. Report on Library Science in Indian Universities. 1965.

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APPENDICES

UGC-CDC RECOMMENDATION

Appendix I : BLISc Course

Core Papers

- i) Library and Information Society
- ii) Library and Information Management
- iii) Library Classification - Theory & Practice
- iv) Library Cataloguing and Subject Indexing - Theory & Practice
- v) Information Sources and Services
- vi) Computer Applications

Elective Papers

- i) School and Children Libraries
- ii) University and College Libraries
- iii) Public Library System
- iv) Government Department Libraries
- v) Research and Development Libraries
- vi) Archives Librarianship
- vii) Engineering and Technology Library and Information System
- viii) Medical Librarianship
- ix) Agricultural Library and Information System
- x) Law Libraries
- xi) Music Libraries
- xii) Industrial Library and Information System
- xiii) Manuscriptology
- xiv) Library Buildings, Fittings and Furniture
- xv) Local Studies Librarianship
- xvi) Non-book Materials

Appendix II : MLISc Course (one year programme)

Core Papers

- i) Information and Communication : Evolution and Development
- ii) Library and Information Management, Sources and Services
- iii) Computer Technology, Library Automation and Information System
- iv) Information Processing and Retrieval
- v) Research Methodology and Informetrics

Elective Papers

- i) Comparative and International Librarianship
- ii) Higher Education and Academic Library System
- iii) Communication, Mass Media and Public Library
- iv) Bibliographic Control
- v) User Education and User Studies
- vi) Education for Library and Information Science

Appendix III : MLISc Course (Two- year Integrated Programme)

Core papers

1st year papers

- i) Foundations of Librarianship
- ii) Library and Information Management
- iii) Library Classification - Theory & Practice
- iv) Library Cataloguing and Indexing - Theory & Practice
- v) Information Sources and Services

2nd year papers

- vi) Information and Communication : Evolution and Development
- vii) Information Processing and Retrieval
- viii) Computer Applications, Library Automation and Information System
- ix) Research Methodology and Informetrics

Optimal papers

Group A

- i) Higher Education and Academic Library System
- ii) Communication, Mass Media and Public Library System
- iii) School and Children Libraries
- iv) Medical Libraries
- v) Law Libraries
- vi) Music Libraries
- vii) Engineering and Technology Libraries
- viii) Agricultural Libraries
- ix) Industrial libraries
- x) Archive Libraries

Group B

- i) Bibliographic Control
- ii) Education for Library and Information Science
- iii) User Education and User Studies
- iv) Comparative & International Librarianship
- v) Manuscriptology
- vi) Preservation and Conservation
- vii) Learning Skill and Reading Habits
- viii) Library Buildings
- ix) Local Studies Librarianship
- x) Non-Book Materials

Appendix IV : M Phil Programme

Paper I : Research methodology

[In addition to theory, students are required to conduct a pilot research project with one of the research methods and present a research seminar]

Paper II : Current Trends in Library and Information Science

[In this paper, students are required to prepare a review paper on current trends in LISc and to make critical evaluation of a recent book/dissertation. Both of these reviews are to be presented in seminar, and followed by report]

Paper III : Literature survey

[In this paper, students are required to study the growth and development of a subject (other than LISc) and to review the literature on it including sources of information. Here, students will have to apply the techniques of condensation and consolidation of information]

Paper IV : Dissertation and Viva-voce

[Students are required to submit a research proposal of one particular topic within LISc, before undertaking it].

BOOK REVIEW

CHOWDHURY (G G). Information retrieval system. 1994. IASLIC; Calcutta. XV, 215p. Price:Rs.250.00 (US\$50.00).

The subject of document retrieval or document surrogate retrieval has been an area of study and research since the last century. The researchers have always tried to find a suitable solution of organisation and retrieval of intellectual content of document matched with user's requirement. The development process which started with manual means for producing printed alphabetical subject indexes have got new dimension due to the emergence and development of new technology. Efforts are on to find an effective solution to the problem of effective information organisation and retrieval system. In this direction, the present publications is an welcome addition to the area of information retrieval (IR) system which provides a comprehensive review of the subject as a whole.

The book has been divided in thirteen chapters starting with the basic concepts of IR system and concluded with the current trend of research in this area. Each chapter has begun with 'Introduction' which gives the perspective of the contents of the chapter. The chapter 1 titled as Basic Concepts of Information Retrieval System discusses the components of IR system, its task and functions, and the major steps to be followed in designing an IR System. Chapter 2 on Subject Analysis and Representation discusses the process of subject indexing. Chapter 3 on Evaluation of Information Retrieval Systems discusses the issues relating to the evaluation of IR System with particular reference to the factors to be considered for measuring the performance of the system including the steps to followed in designing an evaluation program. The Chapter 4 reviews the Evaluation Experiments starting from Cranfield Projects, MEDLARS, SMART and STAIRS Project. Chapter 5 on Search Strategy deals with concept of search strategy and actual search process in the context of IR system, followed by basic concepts of Online Searching and Retrieval in Chapter 6. Chapter 7 discusses Elementary File Searching Techniques. In chapter 8 on Intelligent Information Retrieval, the concepts of artificial intelligent (AI), expert systems and natural language processing have been introduced. Chapters 9 to 12 cover exclusively the various aspects of Natural Language Processing (NLP), including the working of NLP system, recent studies in developing natural language interfaces, some natural language and text processing systems recently developed alongwith the techniques followed therein the problems and prospects of NLP system. The book finally concludes with the review of current trends of research in the area in Chapter 13.

Quite a substantive portion of the book is devoted to the Natural Language Processing (NLP) System. Apparently, this is obvious due the fact that the author has done a considerable work on this area for his research degree. As a result the book provides a good compilation of the attempts made in the development of NLP systems. But, whether any performance evaluation has been made of these systems has not been mentioned.

The aspects of search have been dealt with in three chapters. As long as searching is a sub-system of total IR system, the basics of searching are same irrespective of whether it is online or not, for example, preparation of search strategy and its pre-requisites. The chapters on search strategy and online search could have been dealt in a single chapter and, thus, making it more

(Contd.)

BOOK REVIEW

compact instead of mentioning same concept differently in two places. Similarly, file search techniques are closely dependent on file organisation techniques. Some discussion on the file organisation linked with search techniques and supported by illustration would have increased the understandability of concept. Similarly, worked out examples of some of the formulas used in the document viz, inverse document frequency, weight etc. would have helped the readers to understand the concepts more clearly.

There has been good number of printing mistakes, some of which could have been avoided with little care. For example 'the major steps to be followed in designing an information retrieval system' (page 33, 2nd line) conveys a completely different meaning than what is intended to be.

Apparently, the book is intended to serve both as a review document on the subject and as a text book meant of the students and research workers who would like to understand the subject and pursue further studies and research. The book would satisfy both these groups of users. It not only provides a comprehensive view of the subject as a whole but also analyses of each facet of the subject which is an added advantage. Each chapter is supplemented by a list of reference to facilitate further reading on the subject. The book will serve as a valuable addition in the literature collection of library and information science, in which, there are not many comprehensive review documents on the subject.

- Reviewed by S B Ghosh

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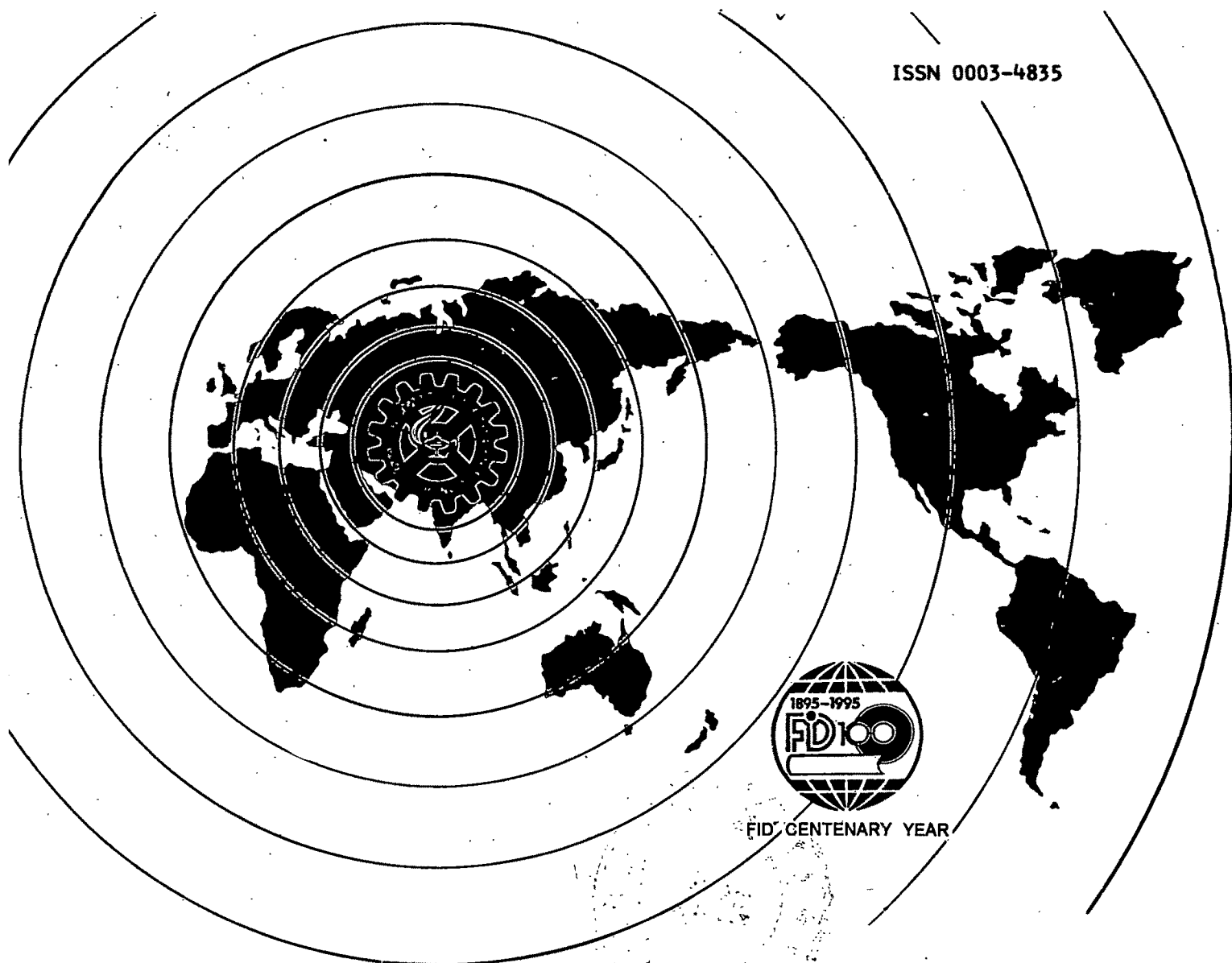
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BIBLIOMETRIC STUDY OF DOCTORAL DISSERTATIONS ON ENGLISH LANGUAGE AND LITERATURE

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Bibliometric analysis for 4066 citations collected from the doctoral dissertations on the English language and literature accepted by Dr. Babasaheb Ambedkar Marathwada University has been carried out to determine the use pattern of the literature by the researchers in English. Provides the main bibliographic forms of literature cited. Non-serial publications i.e. books, published from U.K. and periodicals from U.S.A. are mostly cited. Ranked list of periodicals, books and authors shows that Modern Fiction Studies and Times Literary Supplement are most preferred journals, whereas, American Fiction and Main Currents in American Thoughts are most frequently cited books. Amongst the first ten most cited authors, six are from USA and two each are from UK and India. English citations account for 99% and only one percent of the citations are shared by the two other languages, namely, Marathi and Sanskrit. Countrywise distribution of periodicals and chronological distribution of citations indicate substantial use of older literature with a half-life value of 27.5 years. Authorship study indicates increasing trend towards multiple authorship. The data under study do not exactly fit into the Bradford's Law of Scattering.

INTRODUCTION

Bibliometrics has established itself as a viable and distinctive research technique for studying science of science based on citation data. Citation analysis is one of the most important bibliometric techniques involving analysis of the references forming part of primary communication. Citations are the formal explicit linkages between publications that have particular points in common.

Citoanalytical study of doctoral dissertations or theses which are the products of research activity form an important source of information because normally the first chapter provides that state-of-the-art list of references of previous work. Such studies may be useful for acquisition of materials, provision of better services to patrons and knowing the location of materials. What part of literature is cited most, for how long the literature remains useful to readers, and languages of most cited publications - knowledge of all these provides guidance to collection development policies, individual item selection, and retention and binding decisions.

Such studies have been attempted in different subjects in natural sciences but paucity of such works exists in humanities and social sciences. However, some significant studies have been conducted in some areas of social sciences such as, history, anthropology, political sciences, sociology and agricultural economics [2]. The purpose of the present study is to investigate the use pattern of literature as revealed through the analysis of citations figuring in the doctoral dissertations of English language and literature accepted by Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

OBJECTIVES

The objectives of the study are to :

- i) determine the number of citations per dissertation;
- ii) observe authorship pattern;
- iii) find out the forms of documents used - their languages and countries of origin;

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- iv) compile a ranked list of journals, books and authors;
- v) observe chronological distribution and frequency of cited journals; and
- vi) determine the half-life of the journal literature and the productivity of journals.

METHODOLOGY AND SAMPLE

The total population for this study is 4066 citations that figured in 26 doctoral dissertations accepted by the University till the end of 1992. These cita-

tions pertained to journals, books, dissertations, theses, reviews etc. The bibliographic details for the source (dissertation) and the cited documents were recorded on catalogue cards which were tabulated and analysed.

ANALYSIS

Number of Citations per Dissertation

Table 1 shows that 60% of the dissertations were having citations between 100 - 300, while 30% were

Table 1

Number of citations per dissertation

Sl.no.	Number of citations	Number of dissertations	Percentage
1	2	3	4
1.	Below 100	08	30.77
2.	101-200	11	42.30
3.	201-300	05	19.23
4.	301-400	01	3.85
5.	401-500	01	3.85
	Total	26	100.00

having nearly 100 citations. Only two dissertations had citations between 300-500. The maximum citations were 431 and minimum 56. The average number of citations per dissertation was 156.

Authorship Pattern

Authorship study (Table 2) reveals that 35% of the

articles have been contributed by single authors, double authorship contribution accounts for 40%. Three authored and more than three authored contributions accounted for 25%. This shows that more and more articles are being contributed under joint authorship. Alternatively, it can be said that there is an increasing trend towards multiple authorship [3].

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Table 2

Authorship Pattern

Number of authors	Citations	Percentage
1	2	3
1	424	34.87
2	488	40.13
3	182	14.97
4 and above	122	10.03
Total	1,216	100.00

Bibliographic Forms

Table 3 represents the document preference of authors. Out of 4,066 citations, 2,603 (64%) are books. Periodicals ranked second with 1,216 (29.92%) citations only. This indicates the importance of books to the scholars and also their de-

pendence on books rather than on journals [4]. This may be due to the fact that the basic matter for the study are still found more in books than any other form of documents. The rest of the citations are noticed from reviews (4.8%), Dissertation Abstracts International (1%) and reports (0.27%).

Table 3

Bibliographic forms

Sl.no.	Bibliographic form	Number of citations	%	Cumulative	
				Citations	Percentage
1	2	3	4	5	6
1.	Books	2603	64.01	2603	64.01
2.	Periodicals	1216	29.92	3819	93.93
3.	Reviews	195	4.80	4014	98.73
4.	Dissertation Abstracts	41	1.00	4055	99.73
5.	Reports	11	0.27	4066	100.00
	Total	4066	100.00	4066	100.00

Language-wise Distribution

It can be seen from Table 4 that majority of the

documents 1,205 (99.09%) are in English and rest i.e., 11 (0.91%) are in other languages, namely, in Marathi and Sanskrit.

Table 4

Language distribution

Sl.no.	Language	Number of citations	Percentage	Cumulative	
				Citations	Percentage
1	2	3	4	5	6
1.	English	1205	99.09	1205	99.09
2.	Marathi	07	0.58	1212	99.67
3.	Sanskrit	04	0.33	1216	100.00
	Total	1216	100.00	1216	100.00

Country-wise Distribution of Cited Journals

The alphabetical list of countries that are producing periodicals referred by the scholars (Table 5)

shows that sixty-nine most frequently cited periodicals considered are belonging to 9 countries, out of which 47 (66.52%) are from USA, followed by British journals 12 (22.60%). India accounts for

Table 5

Country-wise distribution (Periodicals)

Sl. no.	Country	Number of		Percentage
		Journals	Citations	
1	2	3	4	5
1.	Belgium	1	8	0.65
2.	Canada	2	16	1.71
3.	India	3	23	2.45
4.	Kenya	1	7	0.75
5.	Netherland	1	10	1.07
6.	Pakistan	1	12	1.28
7.	Singapore	1	26	2.77
8.	U.K.	12	212	22.60
9.	U.S.A.	47	624	66.52
	Total	69	938	100.00

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only 3 journals (2.45%). The analysis reveals that the scholars depends mostly on literature published from USA and UK only.

Country-wise Distribution of Cited Books

It is very important to determine the geographical

scattering of cited books while studying the use pattern of research literature in a particular discipline. It is clear from the Table 6 that nearly 46.87% cited books emerged from UK. USA and India are the next two countries each covering 37.84% and 6.76% of books respectively.

Table 6

Countrywise distribution (Books)

Sl.no.	Country	Number of citations	Percentage
1	2	3	4
1.	U.K.	1220	46.87
2.	U.S.A.	985	37.84
3.	India	176	6.76
4.	U.S.S.R.	29	1.11
5.	France	18	0.69
6.	Australia	11	0.42
7.	Czhekslovakia	09	0.35
8.	Germany	09	0.35
9.	Denmark	08	0.30
10.	Brazil	07	0.27
11.	Hungary	07	0.27
12.	Poland	07	0.27
13.	Canada	06	0.23
14.	Pakistan	05	0.19
15.	Norway	05	0.19
16.	Belgium	03	0.12
17.	Netherland	03	0.12
18.	Scotland	03	0.12
19.	Sweden	03	0.12
20.	Italy	02	0.07
21.	Unidentified	87	0.34
	Total	2603	100.00

Rank List of Periodicals

The journal literature on English language and English literature seems to be widely distributed, as 1,216 articles reported in all the 26 dissertations were obtained from as many as 221 journals. The journals cited for 10 or more times are given in Table 7 with their ranks, countries of origin and citation percentage. This list consists of 32 jour-

nals covering 58% of the journal literature. The analysis also reveals that there is concentration of citations on a very few key journals. The Table indicates that the journal *Modern Fiction Studies*, published from USA, tops the list with a tally of 54 citations. The journal *Times Literary Supplement* (UK) with 46 citations ranks second and *New York Times Book Review* (USA) with 39 citations.

Table 7

Ranked list of the cited periodicals

Sl.no.	Rank	Name of the journal	Country	Number of citations	Citation percentage	Cumulative no. of citation	Cumulative percentage	Remark
1.	1	Modern Fiction Studies	U.S.A.	54	4.44	54	4.44	Subscribed by the Library
2.	2	Times Literary Supplement	U.K.	46	3.78	100	8.22	-do-
3.	3	New York Times Book Review	U.S.A.	39	3.20	139	11.42	-do-
4.	4	Critique	U.K.	38	3.12	177	14.54	-do-
5.	5	Phylon	U.S.A.	36	2.96	213	17.5	-do-
6.	6	College English	U.S.A.	29	2.38	242	19.88	-do-
7.	7	PMLA	U.S.A.	26	2.13	268	22.01	-do-
8.	7	Commentary	Singapore	26	1.13	294	24.4	-do-
9.	8	Saturday Review	U.S.A.	25	2.05	319	26.19	-do-
10.	9	American Literature	U.S.A.	23	1.89	342	28.08	-do-
11.	9	Dial	U.S.A.	23	1.89	365	29.97	-do-
12.	10	Nineteenth Century Fiction	U.S.A.	21	1.72	386	31.69	
13.	10	Time	U.S.A.	21	1.72	407	33.41	-do-
14.	11	Criterion	U.S.A.	20	1.64	427	35.05	-do-
15.	11	Encounter	U.K.	20	1.64	447	36.69	-do-
16.	11	Twentieth Century	U.S.A.	20	1.64	467	38.33	
17.	12	Hudson Review		19	1.56	486	39.89	
18.	12	Sunday Magazine		19	1.56	505	41.45	
19.	12	The Times		19	1.56	524	43.01	
20.	13	Atlantic	U.K.	18	1.48	542	44.49	-do-
21.	13	Nation	U.S.A.	18	1.48	560	45.97	-do-
22.	13	Partisan Review	U.S.A.	18	1.48	578	47.45	
23.	14	American Scholar	U.S.A.	15	1.23	593	48.68	Subscribed by the Library
24.	14	Commonweal	U.S.A.	15	1.23	608	49.91	
25.	14	New Republic	Canada	15	1.23	623	51.14	
26.	14	Southern Review	U.S.A.	15	1.23	638	52.37	
27.	15	Criticism	U.S.A.	12	0.98	650	53.35	-do-
28.	15	London Magazine	U.K.	12	0.98	662	54.33	-do-
29.	15	Scrutiny	Pakistan	12	0.98	674	55.31	
30.	15	Yale Review	U.S.A.	12	0.98	686	56.29	Subscribed by the Library
31.	16	English Studies	Netherland	10	0.82	696	57.11	-do-
32.	16	Listner	U.K.	10	0.82	706	57.93	
33-90.		58 Titles having 9 to 3 citations		325	26.89	1031	84.82	
91-144.		54 Titles having 2 citations		2X54	4.44	1139	93.00	
145-221.		77 Titles having 1 citations each		1X77	6.25	1216	100.00	
		Total :		221	100.00	1216	100.00	

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Rank List of Books

Table 8 lists 25 books arranged in order of their ranks. The books cited at last 3 times have been selected. The total number of books cited by the authors were 2,603, but the first 23 books, have

been selected on above criterion. The analysis of the ranked list reveals that the book *American Fiction* ranks first, followed by *Main Current in American Thoughts* and *American Social Fiction* respectively, both published from U.S.A.

Table 8

Ranked list of cited books

Sl.no.	Rank	Title	Number of citations	Authors
1.	1	American Fiction	13	Maxwell, B.E.S.
2.	2	Main Currents in American Thought	11	Moyne, V.L.
3.	3	American Social Fiction	9	Millgate, Michael
4.	4	Contemporary British Novelists	9	Malin, I
5.	4	Guide to Modern World Literature	8	Soymouramith
6.	5	Fantasy in 20th Century British Novels	7	Sanders
7.	5	Postwar British Fiction: Now Accidents and Attitudes	7	Gindin, J.J.
8.	6	Ideas and the Novel	6	Mc Carthy, Mary
9.	6	The Evaluation of the English Language from Chaucer to the Twentieth Century	6	Mcknight, H.
10.	6	The Sence of Life in the Modern Novel	6	Mizener Arthur
11.	6	The Theory of the Novel	6	Stevick, Philip
12.	7	An Essays on Comedy and the uses of the Comic Spirit	5	Meredith, George
13.	7	Contemporary American Jewish Literature	5	Malin Irving
14.	7	The American Novel and its Traditions	5	Meredith, George
15.	7	The History of English Novel	5	Stevenson, L.
16.	8	Eros and Evil	4	Masters, R.E.L.
17.	8	F. Scott Fitzgerald, A collection of Critical Essays	4	Mizener
18.	8	Indian Writing in English: Critical Essays	4	Maccutchion, David
19.	8	The Art of Creation	4	Edward Carpenter
20.	8	The Cycle of American Literature	4	Millgate
21.	8	Towards Democracy	4	Edward Carpenter
22.	8	Twelve Original Essays on Great American Novels	4	Shapiro
23.	9	American Social Fiction	3	Michael
24.	9	Nostromo	3	MC Laugl Lin, Juliet, C.
25.	9	The Influence of Freud on American Psychology	3	Shakow, David and David Rapaport

Rank List of Authors

The list which includes the authors cited 10 or more

times indicates that amongst the first ten most cited authors six are from U.S.A. and two each from U.K. and India (Table 9).

Table 9

Rank list of authors

Sl.no.	Rank	Name of Author	Times cited
1.	1	F. Scott Fitzgerald	39
2.	2	Ted Hughes	28
3.	3	William Faulkner	25
4.	4	Shri Aurobindo	24
5.	4	Brooks Van Wyck	24
6.	5	Edward Carpenter	23
7.	5	R.K. Narayan	23
8.	6	Mark Twain	19
9.	7	Ernest Hemingway	18
10.	7	Norman Mailer	18
11.	8	Leslie A Fiedler	16
12.	9	Freud Sigmund	15
13.	10	Joseph Conrad	14
14.	10	Aldous Huxley	14
15.	10	Theodore Drieser	14
16.	11	Mulkraj Anand	12
17.	11	James Baldwin	12
18.	11	Anita Desai	12
19.	12	Maxwell Geismar	11
20.	12	C.P. Snow	11
21.	13	Anthony Burgess	10
22.	13	U. Dhumal	10
23.	13	Fredrick Hoffman	10
24.	13	Kazin Alfred	10
25.	13	Philip Roth	10
26.	13	Trilling Lionel	10

Chronological Distribution of Cited Periodicals : Time Span

Time span is relatively long in this study, a period of four decades is needed to cover nearly 90% citations. The maximum number of citations be-

longed to the period 1961-70 (Table 10). It also shows that older references are less cited than the later ones [5]. Nearly, 13% of the citations belonged to the first half of the century and 78% to the second half of the century.

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Table 10

Chronological distribution of periodicals

Years	Citations	Percentage
1990-86	19	1.56
1985-81	33	2.71
1980-76	142	11.68
1975-71	139	11.47
1970-66	228	18.75
1965-61	213	17.52
1960-56	98	8.06
1955-51	81	6.66
1950-46	37	3.04
1945-41	23	1.80
1940-36	16	1.32
1935-31	09	0.74
1930-26	36	2.96
1925-21	28	2.30
1920-16	05	0.41
1915-11	03	0.25
1910-06	0	0.00
1905-01	01	0.08
Period not mentioned	105	8.63
Total	1216	100.00

Chronological Distribution of Cited Books

It can be observed from Table 11 that nearly 69%

of the citations were of the period ranging from 1931 to 1970. Documents pertaining to earlier period were cited less and latter period least.

Table 11

Chronological distribution of books

Years	Citations	Percentage
1901-1910	19	0.73
1911-1920	38	1.46
1921-1930	208	7.99
1931-1940	305	11.72
1941-1950	409	15.71
1951-1960	554	21.28
1961-1970	519	19.94
1971-1980	409	15.71
1981-1990	90	3.46
Period not mentioned	52	2.00
Total	2603	100.00

Frequency of the Cited Periodicals

The frequency distribution of cited periodicals (Table 12) shows that 73% periodicals were cited

1-5 times, while 12% cited 6-10 times, 10% cited 11-25 times, 3% cited from 26-40 times and only 1% cited 41-55 times.

Table 12

Frequency distribution of periodicals

Frequency	Periodicals used	Percentage
1	77	34.84
2 - 5	86	38.91
6 - 10	28	12.67
11 - 15	8	3.62
16 - 20	9	4.07
21 - 25	5	2.26
26 - 30	3	1.36
31 - 35	0	0.00
36 - 40	3	1.36
41 - 45	0	0.00
46 - 50	1	0.45
51 - 55	1	0.45
Total	221	100.00

Half-life of the Journal Literature

To find out the half-life, the citations were divided into 18 groups each comprising a time span of 5 years (Table 13). The last group includes the journals whose years of publication were not given. The graph was plotted by taking period on X-axis and the cumulative number of citations of the journals on the Y-axis (Fig. 1). The maximum number

of citations given as 1,216 on Y-axis cuts at point 'P'. Half number of total citations meet at point 'D' on Y-axis. A line drawn from Point 'D' parallel to X-axis cuts the curved graph at point 'B'. Again another line drawn from Point 'B' parallel to Y-axis meets the X-axis at point 'C'. Distance from point 'D' to 'C' is the half-life of the total literature published during the period 1901 to 1990 which is 27.5 years.

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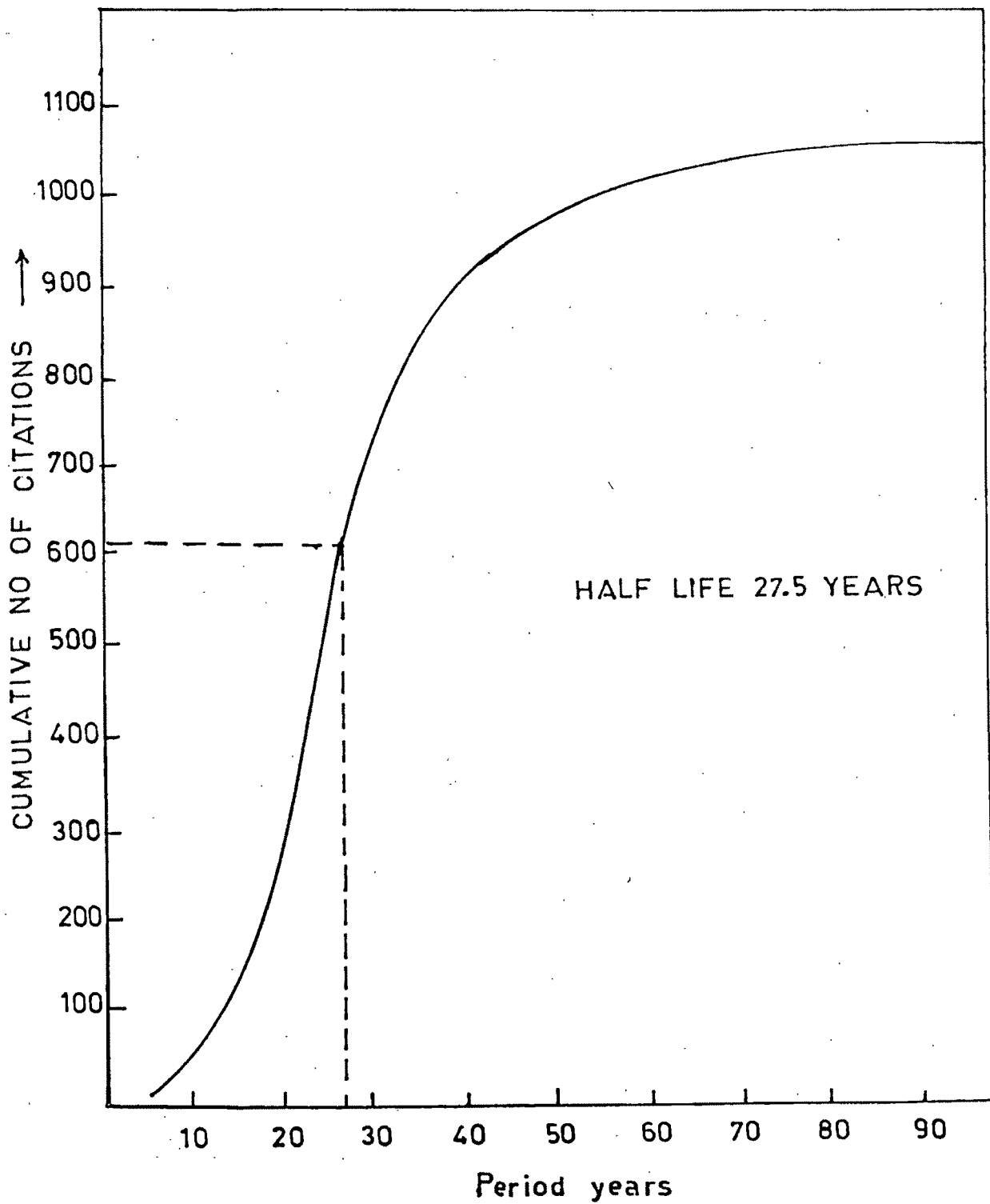


Figure 1 : Obsolescence of English Literature

Table 13
Half-life of the literature

Period	Citations	Cumulative citations	Percentage of citations	Cumulative percentage of citations
1990-86	19	19	1.56	1.56
1985-81	33	52	2.71	4.27
1980-76	142	194	11.68	15.95
1975-71	139	333	11.43	27.38
1970-66	228	561	18.75	46.13
1965-61	213	774	17.52	63.65
1960-56	98	872	8.06	71.71
1955-51	81	953	6.66	78.37
1950-46	37	990	3.04	81.41
1945-41	23	1013	1.89	83.30
1940-36	16	1029	1.32	84.62
1935-31	9	1038	0.74	85.36
1930-26	36	1074	2.96	88.32
1925-21	28	1102	2.30	90.63
1920-16	5	1107	0.41	91.04
1915-11	3	1110	0.25	91.28
1910-06	0	1110	0.00	91.28
1905-01	1	1111	0.08	91.37
Period not mentioned	105	1216	8.64	100.00
Total :	1216	1216	100.00	100.00

Application of Bradford's Law

The law states that if a group of journals are arranged in an order of decreasing productivity that is, the journal that yields the most relevant articles comes first and the most unproductive last, then

the journals will be grouped into a number of zones each producing a similar number of relevant articles. However, the number of journals in each zone will be increasing rapidly. The relationship between the zones is $1 : a : a^2$ [6].

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Accordingly, a graph was plotted with log of journals on the X-axis and the cumulative number of articles on the Y-axis (Fig. 2). The cumulative number of articles was divided into 3 equal zones [7] which are indicated by the points Y_1, Y_2, Y_3 on Y-axis. Then from these three points a line parallel to X-axis was drawn which meets the curve at the points P_1, P_2, P_3 . Then lines were drawn viz., P_1X_1, P_2X_2, P_3X_3 such that they are parallel to Y axis resulting:

- OX_1 = First zone covers 13 journals
- OX_2 = Second zone covers the next 45 journals
- OX_3 = Third zone covers the rest of the 221 journals.

According to Bradford, the relationship between the zones is $1 : a : a^2$ while the relationship in each zones of the present study is $13 : 45 : 23$ which does not fit into the Bradford's distribution.

Table 14

Application of Bradford's Law

R_i	A_i	Ranking	$R_i \times A_i$	Cumulative citations
1	54	1	54	54
1	46	2	46	100
1	39	3	39	139
1	38	4	38	177
1	36	5	36	213
1	29	6	29	242
2	26	8	52	294
1	25	9	25	319
2	23	11	46	365
2	21	13	42	407
3	20	16	60	467
3	19	19	57	524
3	18	22	54	578
4	15	26	60	638
4	12	30	48	686
2	10	32	20	706
7	9	39	63	769
5	8	44	40	809
11	7	55	77	886
3	6	58	18	904
11	5	69	55	959
9	4	78	36	995
12	3	90	36	1031
54	2	144	108	1139
77	1	221	77	1216

R_i - Number of journals
 A_i - Number of citations

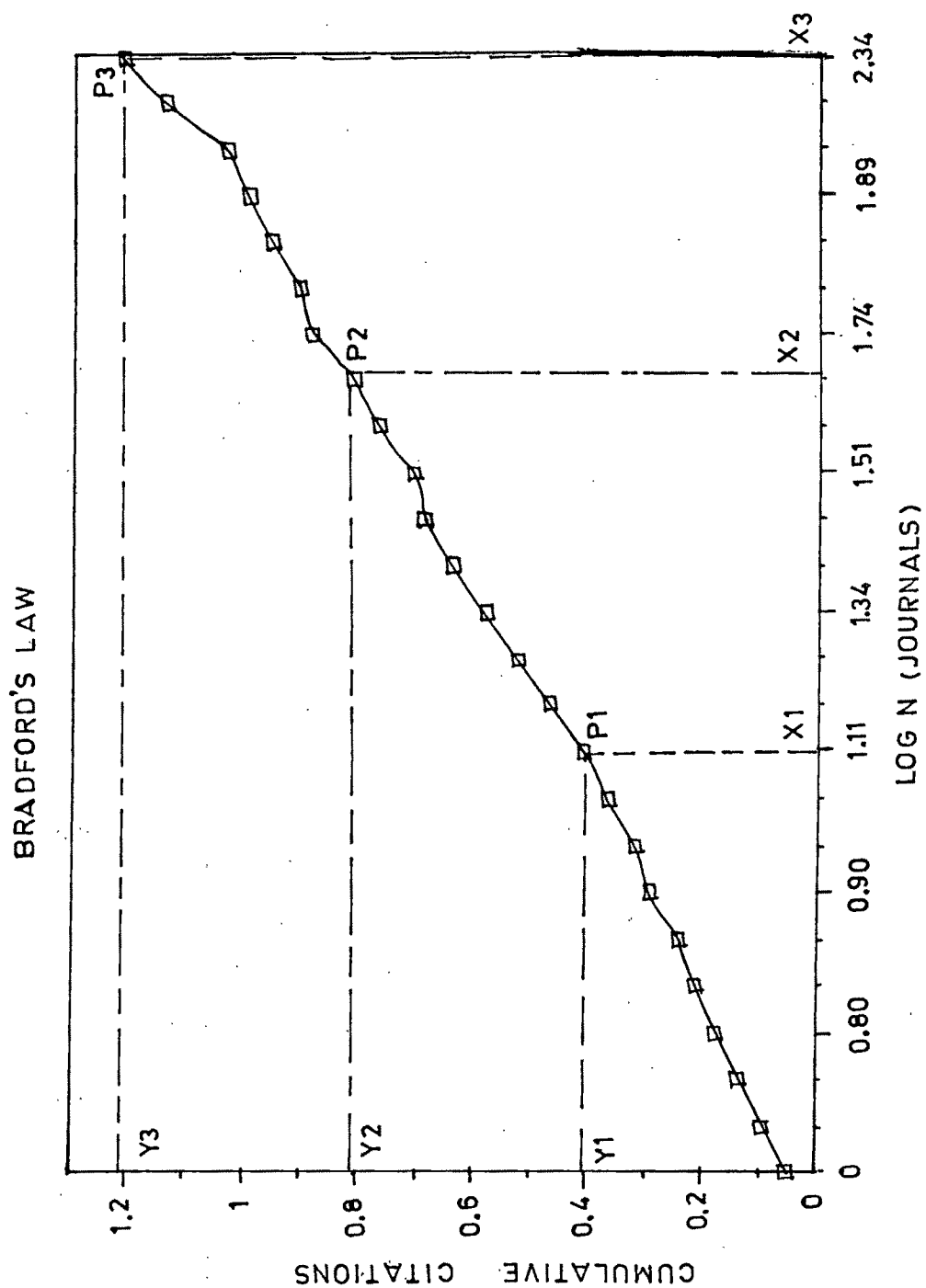


Figure 2 : Bradford's Law of Scattering

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REFERENCES

1. SHARMA (S K) and KUMAR (Vinod). Search of information in science and technology. *Library Progress (International)*. 1993;13,1-2; 32.
2. KHAISER (Jahon Begum) and SHARDA (B A). Journals most frequently cited by Indian linguists : a citation analysis. *Ann. Lib. Sci. Doc.* 1984; 31, 3-4; 173.
3. NAG (D K) and Others. Pattern of use of earth science literature by Indian geologists, a citation analysis. 15th IASLIC Conference, Bangalore. 1988. p. 42.
4. KHAISER (J B) and SHARDA (B A). *Op.Cit.* p. 174.
5. RANA (R). A trend in citation pattern in anthropology. *Ann. Lib. Sci. Doc.* 1982; 29, 4; 173.
6. ROWLEY (J E) and TURNER (B D). The dissemination of information. 1978. Andre Deutsch; London.
7. RAVICHANDRA RAO (I K). Quantitative methods for library and information science. 1983. Wiley Eastern; New Delhi.

SAMPLE SIZE DETERMINATION : A COMPARISON OF ATTRIBUTE AND CONTINUOUS VARIABLE METHODS

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Each of the two methods of sample size determination - the Attribute and the Continuous Variable Method has its use in the investigation of social science problems. The former allows the computation of sample size with reference to any parameters of the variable and, therefore, can substitute for the Continuous Variable Method, but, with and probable increase in sample size. The later is very useful when data are collected in ratio form. However, it demands estimates of dispersion from the mean which may be primary purpose of the research in the first place. The Attribute Method is highly recommended for library and information science since it can be substituted for Continuous Variable Method.

INTRODUCTION

Researchers intending to use sampling procedures for studying library and information science subject face many and diverse methodological problems. One of these problems is the decision about the sample size such as, the minimum amount of data to be collected or whether enough cases available to be statistically valid.

To determine appropriate sample size, one must have a thorough knowledge of the levels of measurement to be used, the hypotheses to be tested and the type of statistical tests most appropriate to the problem. Some knowledge of population parameters is necessary, for example, percentage of occurrence or the standard deviation as well as desired level of confidence and desired accuracy for the sample, expressed as tolerance. Hence, a thorough idea of statistical problems and training are required to decide which of the methods namely, the Attribute and Continuous Variable Method is more suitable for library and information science surveys.

One of the simple and informal method for determination of sample size is to use the sample size used by others studying a similar problem. For example, Roscoe [4] states that in behavioral research there are few occasions when samples smaller than 30 and larger than 500 in size can be justified. While the range from 30 to 500 may appear to be a large one, it does narrow the number to some extent. Unfortunately, no rationale is given for this recommendation, and this view is shared by Uko [5] and others.

The most frequently used statistical approaches are the Attribute and the Continuous Variable Methods. In this paper a basis for comparison with the two approaches is given for calculation of sample size for library and information science surveys. Convenience alone dictated the comparison of the two approaches.

STATISTICAL DETERMINATION OF SAMPLE SIZE

To generalize from a sample to a universe or population, that is, to hypothesize that the mean of the population variable falls within a certain range of values at a certain level of confidence, statistical techniques must be used.

In discussions of the Attribute Method, and the Continuous Variable Method, found in the documents on research methodology and statistics, two key factors are always mentioned [3]. First, the need to establish the level of confidence and the second, the need to establish the degree of accuracy or tolerance that is required.

The Attribute Method deals with the significance of proportions and requires an estimate of the percentage of occurrence of the key variable in the study. The Continuous Variable Method requires

SAMPLE SIZE DETERMINATION

an estimate of the dispersion within the key variable, usually, the standard deviation. In both cases, estimates based on prior knowledge are required. The attribute method does permit the selection of the largest possible sample size by estimating the occurrence of the key variable at 50%.

The confidence levels establish the degree of sampling error that will be permitted in the study. For example, when a confidence level of 95% is used, it is said that the probability is 95%. That means that, most of the time, the confidence interval will contain the true mean and in 5% of the time it will not. Carpenter and Vasu [1] stated that the most commonly used confidence levels were the 95% level and might be used as a standard. The 99% level increases the sample size and the 90% level is least used. To minimize total error that results from non-response, inaccuracy of recording responses or copying figures from one file to another and so on, the confidence level should be set at a conservatively high level. The degree of accuracy required of a sample is translated into statements such as, "The population mean falls with plus or minus 5 units of the sample mean". The researcher establishes this level of tolerance through inspection of the variable in question and a need for accuracy. But, as will be shown, sample size increases dramatically for higher level of tolerance.

THE ATTRIBUTE METHOD

The Attribute Method of sample size determination requires an estimate of the proportion of occurrence of a property or activity in the universe. Dougherty and Heinritz [2] used the example of "books that have been in circulation for fourteen days or more" to illustrate the concept of attribute. In this case, there are only two possible conditions - the case has the attribute or it does not. In effect, there are only two values. Other examples would be books borrowed for five days or more than five days; students who use libraries heavily or not heavily; documents that contain ten or more citations and those containing three or less.

A formula for the computation of Attribute sample size is given by Dougherty and Heinritz [2] and Uko [5].

$$F = \frac{C^2}{t^2} p(1-p).$$

where F = the sample size
 C^2 = the z-score squared representing the desired confidence level.
 t^2 = the desired tolerance expressed as a fraction or decimal
p = the estimated percentage occurrence of the attribute being measured.

The z-score squared and tolerance squared have been used for ease of computation. For those who are more familiar with the z-score notation, the following gives the value of the z-score, and C^2 , for six typical confidence levels:

Confidence level	Z-score	C^2
90%	2.58	6.6564
98%	2.33	5.4289
97%	2.27	5.1529
96%	2.05	4.2025
95%	1.96	3.8416
90%	1.65	2.7225

The percentage occurrence portion of the formula, $p(1-p)$, has the property of maximizing sample size at the 50% level of occurrence for a given tolerance. Hence, sample size is the same for both $p = 40\%$ and $p = 60\%$ or $p = 30\%$ and $p = 70\%$ [2, 5].

This, however, eases the problem of deciding on the criterion variable for sample size calculation in a multivariable study. For example, a hypothetical study might have three variables - age, distance and rate of visiting. Age could be defined as having the attribute of "greater than 18 years", distance having the attribute of "more than three kilometres" and rate of visiting as, "three or more visits per month". A problem in some people's mind would be to decide which of the three should be used in calculating sample size. In the Attribute Method, estimating the percentage of occurrence at 50% would maximize sample size for any variable. If it is necessary to decrease sample size, the choice should go to that variable with the percentage closest to 50%.

If in the above example, $p = 65\%$ for age, $p = 30\%$ for distance and $p = 20\%$ for rate of visiting, sample size is highest for age because it is closest to 50%.

Table 1 illustrates the results of the computation at the 95%, 98% and 99% confidence levels with tolerance set at ± 5 for all variables.

The rationale for choosing age as the criterion variable rather than distance or rate of visiting is simple. By choosing the greatest sample size, all the other

Table 1

Computed sample sizes for three variables with tolerance set at $\pm 5\%$.

	95% confidence	98% confidence	99% confidence
Age 65%	350	494	606
Distance 30%	323	456	559
Rate of visiting 20%	246	347	426
Maximum size 50%	384	543	666

variables will be generalizable to the population. If the maximum size is selected, it is not even necessary to estimate the percentage occurrence of any of the other variables. In some cases, the difference between the maximum size and the size computed for a variable may be great enough to choose the lower of the two. In Table 1, under the heading 95% confidence, there is a difference of 34 cases between the maximum size of 384 and the next highest age, 350. A difference of 34 cases might be a rationale for choosing the lower figure. This rationale could be used when the cost of collecting data for each case is high. If the cost of collecting data is low, choosing the maximum sample size would negate any errors in estimation of the percentage occurrence. This assumes, of course, the same level of tolerance for all variables, but, such an assumption may not be warranted. If the tolerance in Table 1 is changed to 3% for distance, and remains at 5% for both age and rate of visiting, the sample size would be more than double to 896 and would result in the highest sample size. It is important to bear in mind that this interrelationship between tolerance and percentage occurrence exists.

When the cost of data collection is low, the Attribute Method is very good to be used, but when the cost of data collection is high, estimates of the percent-

age occurrence on each variable should be made. Standard tables can be constructed for various levels of confidence and tolerance with $p = 50\%$.

THE CONTINUOUS VARIABLE METHOD

The Continuous Variable Method is similar to the Attribute Method with the substitution of a measure of dispersion for the estimate of the percentage occurrence.

The formula used by Uko [5] is typical :

$$n = \frac{zq^2s^2}{t^2} \quad \text{where,}$$

- n = sample size
- zq = z-score for the confidence level
- s = standard deviation
- t = tolerance or degree of accuracy.

The Continuous Variable Method is used when the variables are in the form of a ratio scale. In this case, an estimate is needed of the standard deviation. The standard deviation can be determined by using an electronic calculator and a small random sample of 10 or 20 cases from the intended sampling frame. A sampling frame consists of a list, directory, index, maps and other records, listing the population elements from which the sample

SAMPLE SIZE DETERMINATION

may be drawn. Some commonly used sampling frames are the telephone directory for telephone interviews, the staff nominal roll for sampling employees of institutions, and membership lists for associations and clubs.

To our example, we might estimate the standard deviations of distance as 0.5 kilometres, age as 5 years and rate of visiting as 0.65 visits per month.

Deciding on the tolerance level is also somewhat different than the procedure used in Attribute Method. A percentage of accuracy was decided upon in the previous method. In the Continuous Variable Method, an absolute value for the degree of accuracy is required such as, ± 0.5 kilometres or ± 5 years of age. The desired degree of accuracy affects sample size considerably.

Table 2

Variation in sample size given different tolerance and standard deviations for three variables.

	Tolerance ($\pm$)	Confidence level	Standard deviation	Sample size
Age	4 Years	95%	15.5	58
	3 Years	95%	15.5	103
	2 Years	95%	15.5	231
	1 Year	95%	15.5	923
Distance	0.50 Kilometres	95%	1.5	35
	0.25 Kilometres	95%	1.5	138
	0.20 Kilometres	95%	1.5	216
	0.10 Kilometres	95%	1.5	864
Visits	0.50 visits	95%	1.05	17
	0.25 visits	95%	1.05	68
	0.20 visits	95%	1.05	106
	0.10 visits	95%	1.05	435

Table 2 illustrates the differences in sample size, given various hypothetical degrees of accuracy. With the Attribute Method, the sample size of the study should be based on the variable that yields the maximum sample size. In the example shown in Table 2, the tolerance of ± 0.10 visits should be used as our criterion variable, as this would allow us to generalize to the population for distance as well as age.

GENERALIZATION

The formulae for calculating the sample size can be used to solve other aspects such as, tolerance, confidence level or proportion accounted for when

"n", the sample size, is known. For example, the attribute formula for sample size is given as :

$$F = \frac{C^2}{t^2} p(1-p). \quad [2]$$

solving for t

$$t = \sqrt{\frac{C^2}{F} p(1-p)}$$

The tolerance can be determined for a given sample size (F), confidence level (C^2), and percentage of occurrence. Taking the sample size of

500, a 95% confidence level, and the 50% occurrence level, tolerance is

$$t = \sqrt{\frac{3.8416}{500} (.5) (.5)}$$

$$= \pm 4.4\%$$

Tolerances can be computed for various level of confidence, sample sizes and confidence rates, using this formula.

Continuous Variable Method can be used to calculate either confidence level or tolerance, given an estimate of standard deviation and a known sample size. The Continuous Variables sample size formula is given as :

$$n = \frac{zq^2s^2}{t^2}$$

solving for t

$$t = \frac{Zq(s)}{\sqrt{n}}$$

where zq is the z-score, s is the standard deviation, and n is the sample size.

From the example in Table 2, where the standard deviation for age was 15.5 and with a 95% confidence level, and a sample size of 500, tolerance can be calculated thus:

$$t = \frac{1.96 (15.5)}{\sqrt{500}}$$

$$= \pm 1.36 \text{ years}$$

It is possible to compute the confidence level given a tolerance, sample size and standard deviation.

In using the Continuous Variable Method with 95% confidence, ± 2 units of tolerance, and a standard deviation of 15.5 yields a sample size of only 231. A calculation of sample size by the Attribute Method

with 95% confidence, $\pm 5\%$ tolerance, and 50% occurrence would yield a sample size of 384 which is 153 cases larger.

CONCLUSION

The main intention of the study is to compare Attribute Method with Continuous Variable Method. The Attribute Method is highly recommended for library and information science surveys as it allows the computation of sample size with reference to any parameters of the variable and can be substituted for Continuous Variable Method.

The choice of the 95% level of confidence is arbitrary in many respects and the estimates of the desired tolerance or the standard deviation are often equally arbitrary depending on the knowledge the researcher has of the population parameters.

The ultimate criterion for choosing sample size is cost. If the costs of gathering each unit of information are high, the method that keeps sample size at a minimum can be used and when the costs per unit are low, methods that increase understanding, planning, and flexibility are to be considered. It is the author's contention that statistically trained researchers will probably continue to use Attribute Method as previously recommended.

REFERENCES

1. CARPENTER (R L) and VASU (E S). Statistical methods for librarians. 1978. American Library Association; Chicago. p. 39.
2. DOUGHERTY (R M) and HEINRITZ (F J). Scientific management of library operations. 1982. The Scarecrow Press; Metuchen. pp.212-216.
3. KERLINGER (F N). Foundations of behavioural research. 1986. Holt, Rinehart and Winston; New York. pp. 34-36, 148-149.
4. ROSCOE (J T). Fundamental research statistics for behavioural science. 1975. Holt, Rinehart and Winston; New York. p. 184.
5. UKO (J U). Basic research method; GDM Handout. 1994. University of Calabar; Calabar. pp. 20-24.

**A REVIEW OF THE UNIVERSAL DECIMAL CLASSIFICATION:
INTERNATIONAL MEDIUM EDITION - ENGLISH TEXT (BS1000M:1993)**

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The history of development of Universal Decimal Classification (UDC) and comparison of its 1985 edition and International Medium Edition (1993) have been provided. Brings out various features and lacunae of the present UDC 1993 edition. Some subjects which merits inclusion in the present 1993 edition has been suggested with listing.

INTRODUCTION

Library classification endeavours systematic arrangement of documents with the help of some classification system or scheme. Any such scheme is a major tool in the organization of documents and other records for their effective retrieval and use. Like most other tools, it requires maintenance and service to be fully efficient. In other words, it needs to be devised in such a way that it should be able to cope up with the growing needs of the library users. Due to the increasing complexity and development of new subjects, it is very difficult for a classifier to incorporate the new developments in the universe of subjects in appropriate place. The Universal Decimal Classification (UDC) published in 1936-37 has undergone many revisions to incorporate such developments. Two important revisions were published in 1985 and 1993 to fulfill the needs and expectations of the classifiers who are using this system for their work.

HISTORY

The Universal Decimal Classification (UDC) was originally derived from the Dewey Decimal Classification (DDC) by two Belgians—Paul Otlet and Henri La Fontaine who adopted DDC because of two reasons - the first, the DDC notation had great attraction for universal usage; and second, the arabic numerals used in this scheme have wider application than any other notational scheme. They

added a number of synthetic devices and auxiliary tables to overcome the problems of total enumerative structure of the DDC and the result was a much more flexible and detailed classification scheme - UDC. The first complete edition of this new UDC was published during 1904 and 1907 as *Manuel du Repertoire Bibliographique Universel*. This first edition consisted of some 33000 subdivisions. The second edition was published during 1927-33. This edition was double in size than the first edition, consisting of some 70000 subdivisions. Both these editions were published in French language. The third edition was published during 1934-51.

Due to the growing need to accommodate science subjects and international usage the English edition came in 1936-37 and later, the British Standards Institution took over the copyright and the responsibility of its publication. This first English edition was referred to as British Standard 1000. The Abridged English edition appeared in 1948 and was referred to as British Standard 1000A:1948. Third revised abridged English edition was published in 1961 with amendments in 1963. In the year 1985, the International Medium Edition - English Text (British Standard 1000M:1985) was published with a more extensive coverage. It replaces 3rd Revised Abridged Edition published in 1961. The BS1000M:1993 International Medium Edition - English text is the latest edition of the Universal Decimal Classification family. In this paper, an attempt has been made to compare BS1000M, 1985 English Medium Edition (UDC 1985) and 1993 English Medium Edition (UDC 1993) to bring out their various features.

TYPOGRAPHIC PRESENTATION

A UDC entry consists of three main elements - i) Class number; ii) Class description; and iii) Amplification.

The class number always appears in the number column at the left side of the page. The class description appears in the text column at the right side of the page, and amplifications which include notes, cross-references, instructions for synthesizing and examples of compound notation etc. appear indented within the text column.

Taking the example of class MILITARY ENGINEERING, the structural display of the subject in BS1000M: 1985 Edition is as follows:

623	Military engineering
.46	Guided missiles. Rockets. Guidance systems, Flight curves, Launching. Warheads
.462	Guided missiles
.1	Surface-to-surface missiles
.12	Tactical missiles
.122	Anti-tank missiles
.124	Artillery missiles
.14	Strategic missiles
.143	Medium-range missiles
.145	Intercontinental missiles

Typographic display of same class in BS1000M:1993 Edition is follows:

623	Military engineering
623.46	Guided missiles. Rockets. Guidance systems, Flight curves, Launching. Warheads
623.462	Guided missiles
623.462.1	Surface-to-surface missiles
623.462.12	Tactical missiles
623.462.122	Anti-tank missiles
623.462.124	Artillery missiles
623.462.14	Strategic missiles
623.462.143	Medium-range missiles
623.462.145	Intercontinental missiles

Difference in display of the class numbers along with their class descriptions in the two editions is clearly understood. The presentation of class numbers in 1993 edition is much more better and helpful than 1985 edition.

To illustrate amplification, let us take the example of class POWER STATIONS in UDC 1993 edition:

620.4	Power stations
	→ 621.311
	Class here only general studies. Class information about particular kinds of power and power station at the number for the subject

Here, cross reference and notes appearing indented under POWER STATIONS are amplifications. From 1993 edition, the → (arrow) is used to mean 'see also'. Previously arrow sign was used to mean 'see' and 'see also'. From 1993 edition, the concept of 'see' is spelt out. As shown in the above example, the classifier looking for the subject POWER STATIONS, is directed to 'see also' class 621.311.

COMMON AUXILIARIES OF LANGUAGE

Systematic table of language number is completely revised in the latest edition. Origin and periods of language are added as *special auxiliary* subdivision in the beginning of the *common auxiliaries* of language table. Languages are divided as natural language and artificial language. Natural language are placed from =1/=8 while artificial languages (including languages used to instruct machines) are placed in =9.

MAIN DIVISIONS

0 Generalities

Class 021 is slightly revised. For e.g., 021.7 LIBRARY PUBLICITY AND PROPAGANDA is added in the new schedule. Class 023 is extended to fulfill some of the important areas, like, Library Statutes, Rules, Regulations, Appointments, Library Committees.

1 Philosophy. Psychology

Under these subject headings no change has been listed. Only class 159. 938 PSYCHOPHYSICS. PSYCHOMETRY is further extended in depth.

2 Religion. Theology

Classes 227 EPISTLES OF THE APOSTLES and 239 POLEMIC THEOLOGY are further extended.

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3 Social Science

Class 301 (SOCIOLOGY) is deleted and now is represented by a new class 316. Classes 303 and 304 are slightly revised. Class 31 is renamed as DEMOGRAPHY. SOCIOLOGY AND STATISTICS. Previously, it was named only as STATISTICS. Classes 312 and 313 are deleted. Now, DEMOGRAPHY. POPULATION STUDIES is represented by a new class 314 in a revised way. As mentioned earlier, the new class 316 SOCIOLOGY is completely revised to meet the new entities in the field of sociology. Provision has been made to give class number for Marxist-Leninist Sociology, Global Societies, Social development, Social communication etc. Class 32 POLITICS is retained in its entirety.

New classes 330.4 and 332.8 are introduced to represent MATHEMATICAL ECONOMICS and ECONOMICS OF HOUSING respectively. The class 331.81 WORKING HOURS. LEISURE TIME. SHIFTS and its sub-division in earlier schedule is deleted now and replaced by 331.3 and 331.4.

Class 346 is used as gap device to represent a new class ECONOMIC LAW. LAW OF GOVERNMENT CONTROL OF THE ECONOMY.

Class 36 is renamed as ENSURING THE MENTAL AND MATERIALS NEEDS IN LIFE.

Class 362 is dropped and included in expanded class number 364. Class 365 and 366 are new classes. These two classes are created to represent ACCOMMODATION DESIRES AND THEIR FULFILMENT, and CONSUMERISM respectively. Further, class 368.3 LIFE INSURANCE and class 368.4 SOCIAL INSURANCE are deleted. Class 368 is expanded upto 368.9 representing PRIVATE INSURANCE FOR INDIVIDUAL. A new class 369 is introduced to represent SOCIAL INSURANCE.

4 Language

This class is still left vacant for future expansion. Language is merged with class 80 LITERATURE.

5 Mathematics and Natural Sciences

A very useful and important class which is newly introduced in 1993 edition is 504 ENVIRONMENTAL SCIENCE. This class will take care of the latest developments in the field of environmental science.

Class 511 is little expanded to cover some of the important aspects of Mathematics, such as, METRIC NUMBER THEORY and NON-COMMUTATIVE ARITHMETIC represented by 511.7 and 511.8 respectively. Class 519.1 COMBINATORIAL ANALYSIS. GRAPH THEORY is expanded.

A major change in class 52 ASTRONOMY. GEODESY is the introduction of a new class 528.8 to represent REMOTE SENSING. This subject was not represented earlier and was very difficult to assign a class number relating to this subject.

In class 53 PHYSICS, 535.8 is introduced to represent APPLICATIONS OF OPTICS IN GENERAL. This class was represented earlier in UDC 1961 edition but deleted from 1985 edition. Now again, it is reintroduced. Concepts of hierarchy lapses is noticed when we see class 538.9, as class 538 is not listed anywhere in the schedule. Sub-divisions enumerated without specifying the main class like this causes ambiguity.

The subject THEORETICAL CHEMISTRY. PHYSICAL CHEMISTRY (541) is allotted a new number 544 to deal with the subject in depth.

6 Applied Science. Medicine. Technology

Class 608 (INVENTION AND DISCOVERIES IN SCIENCE AND TECHNOLOGY) is deleted from applied sciences and now the subject is represented by 001.894.

More special auxiliaries are added in class 614.8 to incorporate topics like PROTECTION OF THE BODY OR ITS PARTS AGAINST SPECIFIC INFLUENCES. Class 621.397 PICTURE TRANSMISSION. TELEVISION is revised to add some concepts like, video technology including video equipments, video cassettes, video discs, video recording etc. Due to these additions this class is renamed as VIDEO TECHNOLOGY. TELEVISION ENGINEERING.

Class 621.7 is renamed as MECHANICAL TECHNOLOGY IN GENERAL: PROCESSES, TOOLS, MACHINES EQUIPMENT. Under this section sub classes 621.751, 621.753 and 621.757 are deleted. Now, TOOL MAKING is represented by class 621.71.

Class 629 TRANSPORT VEHICLE ENGINEERING is widely enumerated. Under this class, 629.1 and its sub-divisions are completely deleted. In the new revision LAND VEHICLE ENGINEERING (EXCLUDING RAIL VEHICLES) is represented by class number 629.3 while WATER CRAFT ENGINEERING, MARINE ENGINEERING, BOATS, SHIPS, BOAT BUILDING, SHIP BUILDING are represented by class number 629.5. A new class 629.9 is introduced to represent CONVERTIBLE VEHICLES designed for normal use in or on more than one medium.

In class 64, HOME ECONOMICS 64.02 is deleted and 640 is the new class for TYPES OF HOUSEHOLD. HOUSEHOLD MANAGEMENT.

Under class 661 CHEMICAL PRODUCTS, three new subclasses 661.15, 661.16 and 661.17 are introduced. Subclass 661.73 is deleted and 661.74 is the new subclass for ORGANIC ACIDS. THEIR SALTS, ESTERS etc.

In UDC 1985 Edition, class 662.215.2 to class 662.215.5 occur twice. This is due to printing error and is removed in UDC 1993 edition.

Class 665.3 VEGETABLE OILS. FATS. WAXES. PHOSPHATIDES is widely enumerated.

A few special auxiliaries are added under the class 677, such as, 677.03 RAW MATERIALS OF THE TEXTILE INDUSTRY, 677.08 WASTES AND BY-PRODUCTS OF THE TEXTILE INDUSTRY. Class 677.7 CABLE INDUSTRY is deleted. This class is accommodated in 679.7 as CABLE AND CORDAGE INDUSTRIES

Some special auxiliaries are also added under the class 678 like, 678.08 STEREO STRUCTURE INCLUDING STEREOSPECIFIC POLYMERS. ATACTIC POLYMERS, 678.09 MATERIALS RESULTING FROM PARTICULAR PROCESSES. Class 678.82 to class 678.86 are named as VARIOUS MACROMOLECULAR MATERIALS not included in 678.4/.7. A new class 679 is introduced to represent INDUSTRIES BASED ON VARIOUS PROCESSABLE MATERIALS. Under this class 679.82 is used as gap device to represent ARTIFICIAL STONES MADE BY CHEMICAL SYNTHESIS etc.

Class 681.3 DATA PROCESSING EQUIPMENT (COMPUTERS) still need to be thoroughly revised. The only topic "Artificial languages used to instruct machine. Programming languages. Computer languages" is added as a new revision. This is represented as 681.3.062 in the latest schedule. But important computer related topics like Decision Support Systems, Expert Systems, Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Virtual Reality, Parallel Processing, Image Processing, Pattern Recognition etc. are not given any specific class numbers in the present schedule. Efforts should be made to incorporate all these new computer related topics with exhaustive enumeration.

Special attention is given to the class 681.5 AUTOMATED CONTROL ENGINEERING. Special auxiliaries as well as sub-divisions

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of this class is exhaustively enumerated. Class 681.7 OPTICAL APPARATUS AND INSTRUMENT is placed far away from class 535 OPTICS. Due to this, documents related to optics will be shelved in 535, whereas documents related to optical apparatus like microscopes, telescopes etc. will be shelved in class 681.7, though these need to be classed and shelved at one place.

The class 69.02 STRUCTURAL PARTS AND ELEMENTS OF BUILDINGS is deleted. Now, class 692 is assigned in place of 69.02 to cover the same subject.

- 7 Arts. Recreation. Entertainment. Sport**
No significant change has been made under this class. Only class 779 COLLECTIONS OF PHOTOGRAPHS. FILMS etc. is altogether deleted.

- 8 LANGUAGE. LINGUISTICS. LITERATURE**
Class 800 and its sub-divisions are deleted. This class is accommodated in 801 and 81 with enumeration.

- 9. GEOGRAPHY. BIOGRAPHY. HISTORY**
These classes are retained in their entirety. No change has been made in these classes.

APPEARANCE OF NEW SUBJECTS IN UDC 1000M 1993 EDITION

Some of the new subjects which are appearing for the first time in UDC 1993 Edition are given below:

Class No.	Class Description
330.4	Mathematical economics
332.8	Economics of Housing
346	Economic law. Law of Government control of the Economy
366	Consumerism
504	Environmental science
528.8	Remote Sensing
621.397	Video Technology

629.9	Convertible vehicles
679	Industries based on various processable materials
681.3.062	Artificial Language used to Instruct Machines. Programming Languages. Computer Languages.

CONCLUSION

Some of the important subjects which do not find any place in 1993 edition are: virtual reality, neural networks, multimedia, hypertext, computer numerical control, pattern recognition, expert systems, image processing, voice processing, finite element methods, flow visualization, signal processing, fiber optics, electronic publishing, materials failure analysis, tribology. The revision of the UDC has immense importance because it directly affects the intellectual content of this classification system which is used world wide. It is suggested that in future revisions, UDC will incorporate all these subjects to fulfill the needs of the classifier. In spite of some of its limitations in revision, the efforts of FID to bring out UDC 1993 edition is appreciated deeply by a wide range of users of this scheme of classification all over the world.

REFERENCES

1. UNIVERSAL DECIMAL CLASSIFICATION : English Medium Edition. 1985; Part 1. BS1000M.
2. UNIVERSAL DECIMAL CLASSIFICATION : English Medium Edition. 1993; Part 1. BS1000M.
3. SATYANARAYANA (VVV) : Universal Decimal Classification, International Medium Edition - English text (BS1000M:1985) : a critical review. *Ann. Lib. Sci. Docum.* 1989; 36, 3; 91-95.
4. GILCHRIST (A) and STRACHAN (D). The UDC: essays for a new decade. 1990. ASLIB; London.

AN ANALYSIS OF THE STUDENTS' FEEDBACK ON THE LIBRARY RESOURCES, FACILITIES, SERVICES AT A NATIONAL LEVEL MANAGEMENT INSTITUTE - A CASE STUDY

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Reports the findings of a feed back survey conducted to find out the effectiveness of services rendered by the Indian Institute of Management, Lucknow library.

PGP is a two-year, full time residential programme designed to develop professional managers to shoulder varied responsibilities in organizations in different sectors of the country's economy.

INTRODUCTION

The Indian Institute of Management, Lucknow (IIML) was established in July 1984 by the Government of India as one of the four national level management institutes with regard to business, industry, and public services through pursuit of excellence in management education, research, consultancy, and training [1]. Among the various programmes undertaken by the Institute to fulfill its mission, the Post Graduate Programme (PGP) deserves special mention. Starting with an intake of 27 students in its first batch (1985-87), the intake has steadily grown over the years to 118 in the ninth batch (1993-95) as shown in figure below :

THE IIML LIBRARY - IT'S FACILITIES & SERVICES

The library is the main learning resource centre of the Institute and provides services and facilities required for the Institute's teaching, training, research, and consultancy programmes. The library presently operates from a large building on the campus with a provision of 50 seats accommodation in two air-conditioned reading halls kept open from 9.00 a.m. to 12.00 midnight on week-days and from 9.00 a.m. to 5.30 p.m. on Saturday and Sundays. It's fast growing resource includes an up-to date and well balanced collection of nearly 45,000 select documents in the field of manage-

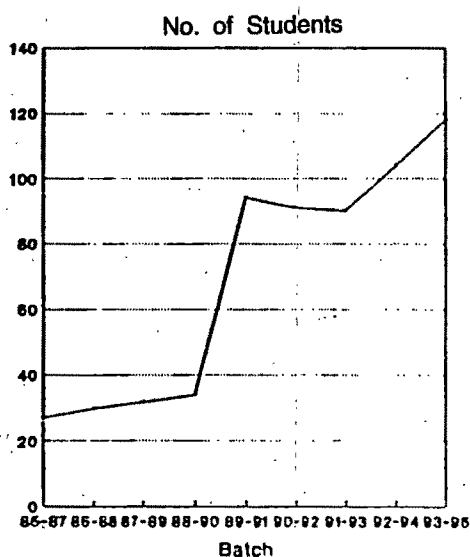


Fig. : Growth in the intake of PGP students at IIML during 1986-87 to 1993-95

AN ANALYSIS OF THE STUDENTS' FEEDBACK ON THE LIBRARY RESOURCES

ment and related areas including about 6000 volumes of important reference sources. Besides currently subscribing to 416 periodicals, the library is acquiring back files of all the core periodicals in microforms and has, by now, developed a microform collection of 10570 microfilms/fiche. The library also stocks a collection of about 800 reports of select corporations of the country as well as a set of 965 other important and similar documents. Recently, the library has started developing its collection of audio-visual (AV) materials and, presently, stocks about 200 documents in AV form.

Besides providing routine library services like circulation, inter-library loan, bibliographic services, reference, etc., the library also provides weekly Current Awareness Service of periodical literature - Current Contents, and a monthly Current Additions of books/reports to its users.

The library has automated most of its house-keeping operations such as, acquisition, serials control, cataloguing, and circulation service including a Online Public Access Catalogue (OPAC). The automation activities of the library are supported by one PC/AT 486, one PC/AT 386, five PC/ATs 286 and two PC/XTs with four dot matrix printers and two letter quality printers. All the machines are

connected to a central server at the main computer centre of the Institute in LAN environment. A CD-ROM work station has recently been installed to facilitate the use of CD-ROM databases acquired by the library.

The library services are extensively used by student communities and supplement class room teaching. To assess the effectiveness of the services, regular formal feedback, in addition to informal feedback, is obtained through a structured questionnaire based on which the resources and services are developed. The findings of the survey for the year 1993-95 is presented in the following section. The survey findings are presented in the form of quantitative response relating to the services, the inference which may be drawn from it and the measures that can be helpful to improve the services.

FEEDBACK SURVEY & FINDINGS

Out of the total graduating student population of 118 of 1993-95 batch, 116 students (98.3%) responded to the survey, thus, ensuring well representation of view point of the students on the library services.

1. AWARENESS LEVEL : Q. Were you aware of all the different types of learning resources held by the library?

Response	Type of Resource	% of Respondent's awareness
	Books	100
	Current Periodicals	100
	Bound Periodicals	85
	Newspapers/Magazines	100
	Reference Collection	85
	Corporate Reports	56
	Audio-Visual Materials	53
	Microforms	40
	CD-ROM	62

Inference/s : There is scope for increasing awareness level of resources, particularly, for the microform collection; audio-visual materials; corporate reports; and CD-ROMs.

Measure/s : More inputs about library resources through regular presentations (particularly during the induction module), handouts, guided tours and sign systems supported by demonstration on the use and benefit of different types of collections, such as, microforms, CD-ROMs, Corporate Reports, etc. can also be helpful.

2. USE LEVEL : Q. *What was your level of use of the library's resources? [What percentage of reading material came from library collection.]*

Response	Use Level	Respondent
	25%	30 (25%)
	50%	56 (48%)
	75%	26 (24%)
	100%	04 (03%)

Inference/s : There is scope for increasing use level.

Measure/s : Further enrichment of the collection, by adding useful general reading materials (including classical fiction) and reference sources will be helpful.

Increase in retention time for reserved documents and entitlement for issuance of reference materials and periodicals for a short period can also be helpful.

3. COLLECTION MEETING PGP REQUIREMENTS : Q. *Upto what level did your library resources meet your academic (PGP) requirement?*

Response	Met Requirements	Respondents
	25%	15 (12%)
	50%	21 (18%)
	75%	51 (44%)
	100%	29 (26%)

Inference/s : Collection development policy needs to address this issue.

Measure/s : Collection development of Indian literature in some of the areas, particularly Marketing, Finance, Accounting, etc. needs special attention.

4. RATING OF THE BOOK COLLECTION : Q. *How do you rate the overall book collection of your library?*

Response	Rating	Excellent	Good	Average
Respondents	:	56 (48%)	57 (49%)	03 (03%)

Inference/s : Selections are, generally, upto expectations.

Measure/s : Fine tuning of selection policies can be useful.

AN ANALYSIS OF THE STUDENTS' FEEDBACK ON THE LIBRARY RESOURCES

5. **RATING OF THE BOOK : COLLECTION (IN AREA/S OF INTEREST)** : Q. *How do you rate the book collection of your library in the area/s of your interest?*

Response : Rating : Excellent Good Average
 Respondents : 34 (29%) 73 (63%) 09 (08%)

Inference/s : Data do not serve the purpose as the area/s is/are not known, fault in the question itself.

Measure/s : Modification of the question for future surveys to know the specific area/s that are good, bad and so on will be helpful.

6. **RATING OF PERIODICAL COLLECTION** : Q. *How do you rate the periodical collection of your library?*

Response : Rating : Excellent Good Average Poor
 Respondents : 53 (46%) 46 (40%) 16 (14%) 1 (1%)

Inferences/s : Periodical collection meets the requirements.

Measure/s : Microform collection of backfiles of periodicals needs balancing and further updation.

7. **RATING OF REFERENCE COLLECTION** : Q. *How do you rate the reference collection of your library?*

Response : Rating : Excellent Good Average Poor
 Respondents : 37 (32%) 60 (52%) 18 (16%) 01 (01%)

Inference/s : Reference collection is satisfactory, but there is a scope for improvement.

Measure/s : Reference collection needs to be constantly updated and equipped with standard reference works in the area/s of interest.

8. **PERCENTAGE OF USAGE** : Q. *What has been your percentage of reading literature in various forms?*

Response :

Form	upto 20%	21% to 50%	51% to 80%	81-100%
Books	12 (10%)	49 (42%)	50 (44%)	5 (4%)
Periodicals	96 (82%)	18 (16%)	02 (02%)	0
Magazines/ Newspapers	82 (71%)	34 (29%)	0	0
Microforms	56 (48%)	0	0	0
Audio-Visual	61 (53%)	0	0	0
Corporate Reports	67 (58%)	0	0	0

Inference/s : Books, periodicals and magazines account for most of the readings. Microforms, audio-visual materials and corporate reports found a low usage.

Measure/s : Further augmentation of the facilities to use microforms, audio-visual materials, and corporate reports will be helpful. Enriching the corporate report collection and audio-visual materials will also be helpful.

9. RATING OF THE READING ENVIRONMENT : Q. *How would you rate the reading environment?*

Response :

Location	Excellent	Good	Fair	Average	Poor
General Book Stacks	46 (40%)	52 (45%)	12 (10%)	05(04%)	01 (01%)
Reference Room	58 (50%)	44 (38%)	11 (9%)	02 (02%)	01 (01%)
Periodical Sec.	57 (49%)	46 (40%)	08 (07%)	03 (03%)	01 (01%)
Mazagine Area/ Text Book Section	61 (53%)	44 (38%)	09 (08%)	01 (01%)	01 (01%)

Inference/s : Operation of library from a very congested location is an obstruction to its usage. Construction of a new library building, to accomodate [and provide for adequate and standards space requirements in terms of] document, readers and staff is the only solution.

10. BORROWING ENTITLEMENT : Q. *How did you find your borrowing entitlement?*

Response : Rating : Quite OK OK Not Satisfactory
Respondents : 93 (80%) 21 (18%) 2 (2%)

Inference/s : Borrowing entitlement meets the requirements.

Measure/s : Continue with existing entitlement.

11. CIRCULATION/ REFERENCE SERVICES : Q. *How do you rate the behaviour of the Circulation and Reference Staff of the library?*

Response : Rating : Excellent Good Fair Average
Respondents : 92 (79%) 22 (19%) 02 (02%) 01 (01%)

Inference/s : Concerned staff members are generally helpful, cooperative, exemplary, courteous, excellent, and efficient. The existing efforts for making library staff knowledgeable need to be continued.

Measure/s : It would be an asset if all the staff members are more knowledgeable about the library resources & their organization, facilities and services.

AN ANALYSIS OF THE STUDENTS' FEEDBACK ON THE LIBRARY RESOURCES

- 12. LIBRARY TIMINGS** : Q. *Please comment on the existing library timings.*
- | | | | |
|----------|-------------|----------|--------------------|
| Response | Rating | OK | Could be increased |
| | Respondents | 53 (46%) | 63 (54%) |
- Inference/s : Increase in library hours on Saturdays/Sunday will be helpful.
- Measure/s : Library timings as 9.00 a.m. to 12.00 midnight on working days and 9.00 a.m. to 7.30 p.m. on holidays can serve the purpose, well.
- 13. READERS' ASSISTANCE** : Q. *How would you comment on the way, you were attended to on occasions, when you wanted some assistance from the library personnel to locate a document/to be guided to a document, and so on?*
- | | | | | | |
|----------|-------------|----------|----------|----------|----------|
| Response | Rating | Excelent | Good | Fair | Average |
| | Respondents | 81 (70%) | 31 (27%) | 04 (03%) | 01 (01%) |
- Inference/s : Satisfactory level of assistance rendered.
- Measure/s : More attention will always be helpful.
- 14. OVERALL SERVICES** : Q. *How do you rate the overall services of the library?*
- | | | | |
|----------|-------------|-----------|----------|
| Response | Rating | Excellent | Good |
| | Respondents | 78 (67%) | 38 (33%) |
- Inference/s : Generally satisfied with the services of the library.
- Measure/s : To keep it up.
- 15. IMPORTANT ATTRACTIONS** : Q. *Which/what services did impress you the most in the library?*
- | | | |
|----------|--|-----------|
| Response | Library Collection | 102 (88%) |
| | Arrangement of Materials | 93 (80%) |
| | Computerized Circulation | 80 (69%) |
| | On-line Public Access Catalogue (OPAC) | 76 (66%) |
| | CD-ROM Databases | 73 (63%) |
| | Reprographic Services | 57 (49%) |
- Inference/s : Library's collection (learning resources) and its arrangement have impressed the students very much. They are also comfortable with the use of information technology (IT) devices, products and services.
- Measure/s : Selectivity in acquiring reading materials and their arrangement to suit the ease and convenience of the users needs to be ensured. Also, increased use of IT devices, products and services will be of much needed relief to the users.

16. OVERALL VIEWS : *Q. Your overall views/suggestions to further develop the library, its resources, facilities, and services.*

Response : All students did not respond to this question, but some did. Some suggestions regarding the reading materials and their accessibility, reading environment are outlined as follows:

Reading Materials :

Acquiring of more documents (i) of Indian authors; (ii) of general interest i.e. fiction, autobiographies, classics, etc; (iii) on public and private sector corporations; (iv) on specific subject areas like, Operations & Materials Management; Sector Specific Industries; Merchant Banking; Stock Exchange; Marketing have been suggested.

Reading Environment :

Augmentation of (acute) space constraints; elimination of noise; stairs need to be carpetted to avoid noise; shelving of documents more frequently are some of the suggestions.

Accessibility :

Some of the suggestions given are restriction of number of books that can be reserved; reducing the document retention period; faculty members returning of documents on time; updation of catalogues as and when due; improvement of subject catalogue; allowing overnight issue of periodicals; making available hard copies of the content pages from microforms; improving facilities for easier and quick access to microforms and xeroxing.

In addition to these valuable suggestions, the library was viewed as "..... the best resource of IIML"; "..... most professionally managed department of the Institute"; ".... the best managed library ever used/ come across"; "too good" ; "..... excellent team work" etc.

CONCLUSION

The purpose of presenting the survey analysis in this fashion is to show how library and information managers (LIMs) can involve their clientele in the library development process. Suggestions put forth by respondents (as also recorded under the "Measure/s" in the survey analysis above), however simple they may appear to be, if carefully implemented, can make useful contributions, in the overall development of the library, its resources, facilities, and services. Moreover, conduct of such surveys is not to be a one time affair, but a regular one.

ACKNOWLEDGEMENT

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REFERENCE

1. IIM Lucknow, Annual Profile; 1993-94.

SHORT COMMUNICATION

EVALUATION OF COURSE MATERIALS OF CORRESPONDENCE COURSES ON LIBRARY & INFORMATION SCIENCE : A CASE STUDY

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Some of the barriers encountered in studying the course materials of correspondence courses on Library and Information Science (LIS) in India have been focused. This case study with cataloguing practical subject shows that mis-interpretation of rules and printing mistakes are the two major barriers for correct understanding of the subject

INTRODUCTION

Correspondence courses are conducted, at present, by a number of universities in India, both at the Bachelor of Library & Information Science (BLIS) as well as at the Master of Library & Information Science (MLIS) levels. Though some of them have arrangements of contact sessions for their registered students at various places, some does not have such facilities. Where such facilities are not available, students mainly depend upon the course materials (CMs) provided by them. Of

the universities conducting correspondence/distance education courses, the Annamalai University (AU) and Madras University (MU) have both BLIS and MLIS courses. The Indira Gandhi National Open University (IGNOU) had so far BLIS only and have started the MLIS course since 1994.

In this paper, taking the subject of Cataloguing Practical, as example, an attempt has been made to highlight the kind of barriers the students usually encounter if they solely depend upon the course materials.

COURSES ON CATALOGUING PRACTICE

All the three universities viz, AU, MU & IGNOU, have prescribed Classified Catalogue Code (CCC) and (Anglo American Cataloguing Rules, 2nd edition (AACR2) for cataloguing practical.

Correspondence/Distance Education Courses

University	BLIS			MLIS		
	Title of paper	Paper no.	Coverage	Title of paper	Paper no.	Coverage
AU	Cataloguing Practical	6	CCC AACR 2	Information Processing Practical	2	AACR 2
MU	Cataloguing Practical	6	CCC AACR 2	-	-	-
IGNOU	Cataloguing Practical	4 P	CCC AACR 2	-	-	-

The course materials cover (a) some essential rules; (b) few worked out examples to demonstrate the rules; and (c) some exercises as problems to be worked out by the students.

MIS-INTERPRETATION OF RULES

A serious barrier in the form of interpretation of the rules is found as revealed in the worked out

examples.

Case 1

**AU MLIS Course Materials (AACR2) Lessons :
1 - 8**

Transcription of a title page as printed on page 47 is reproduced below :

QUALITY FOR PROGRESS AND DEVELOPMENT
Papers presented at the

First Asian Congress on Quality and Reliability,
New Delhi, India

30 October - 2 November 1989

P.K. BOSE
S.P. MUKHERJEE
K.G. RAMAMURTY

WILEY EASTERN LIMITED

NEW DELHI BANGALORE BOMBAY MADRAS HYDERABAD

Other information as printed on the same page are:

Copyright year 1989, Preliminary pages xxiii, Textual pages 876, size 27 cm, ISBN 81-224-0240-2, Price Rs. 380/-, call no. 303.3 BOS, Acc no. 41781.

The course material interprets this as an example of Shared Authorship having three authors, as is apparent from the write up provided at page 47, based on which the example has been worked out as (page 48):

Bose, P.K. Quality for progress and development/P.K. Bose, S.P. Mukherjee, K.G. Ramamurthy. - New Delhi. - Wiley Eastern Ltd., c 1989. xxiii, 876p.; 27 cm. Paper presented at the first Asian Congress on Quality and reliability. New Delhi, India. ISBN 81-224-0240-2: Rs. 380/-.

EVALUATION OF COURSE MATERIALS OF CORRESPONDENCE COURSES

(i) Whereas, names of three persons do appear prominently on the title page, this is not a case of shared responsibility having three personal Indian authors. But, the document has actually been emanated from a Corporate Body (CB), i.e., Conference. The relevant AACR2 Rule 21.1 B2 prescribes that the main entry of a book will be under the name of the Corporate Body (CB) provided:

- a) The book has been emanated from a CB;
- b) It satisfies the rule 21.1B2, category (d); and
- c) The CB has its name.

AACR2, Rule 21.1 B2 - *"General. Enter a work emanating from one or more corporate body under the heading for the appropriate corporate body (see 21.4B, 21.5B) if it falls into one or more of the following categories : d. those that report the collective activity of a conference (e.g., proceedings, collected papers),.... falling within the definition of a corporate body (see 21.1B1) provided that the conference,.... is prominently named (see 0.8) in the item being catalogued."*

In the footnote serial no. 2 on page 313 the code mentions : *"Consider a book to emanate from a corporate body if it is issued by that body or has been caused to be issued by that body or if it origi-*

nated with that body".

Even, it has been emanated from a CB and satisfies Rule 21.1B2, category (d), one cannot choose the CB for the Main Entry heading, if the Conference does not have a name.

Rule 21.1B1 *"Consider a corporate body to have a name if, in a script and language using capital letters for proper names, the initial letters of the words referring to it are consistently capitalised, and/or if, in a language using articles, the words are always associated with a definite article. Typical examples of corporate bodies are associations and conferences ". In the footnote serial no. 1 on page 313 of AACR2 it says "Conferences are meetings of individuals or representatives of various bodies of common interest, or meeting of representatives of a corporate body that constitute its legislative or governing body".*

Thus, the book actually should get corporate authorship under conference, as it satisfies all its conditions i.e., Rule 21.1B2, category (d) and the conference has a name. Similarly, the rules for descriptive cataloguing have not been properly followed in the example.

Thus, the Main Entry should have been

	Asian	Congress on Quality and Reliability (1st : 1989 : New Delhi). Quality for progress and development : papers/presented at the First Asian Congress on Quality and Reliability, New Delhi, India, 30 October - 2 November 1989; [editors], P.K. Bose, S.R. Mukherjee, K.G. Ramamurthy. - New Delhi: Wiley Eastern, [C 1989]. xxiii, 876 p.; 27 cm. ISBN 81-224-0240-2 : Rs. 380/-
--	-------	--



Case 2

IGNOU Course Material BLIS (AACR2)

The material (page 91) says : "When an author is known by more than one name, the following pro-

cedure has to be adopted : (i) the name that appears most frequently in the person's works; (ii) the name that appears most frequently in the reference sources; (iii) the latest name". Then, it demonstrates the rule with the following example :

"Gunther, Heinz
Battalion 999/Heinz G. Konsalik [<i>i.e.</i>
Heinz Gunther]; translated by Oliver Coburn".

Main entry is under the well-known or the present name."

The main entry (ME) has been done probably under the most frequently used name of the author, i.e., Heinz Gunther. The note given above does not help the students to understand the rules clearly for choice of headings.

On the title page, the other name of the author 'Heinz G. Konsalik' appears. In the descriptive part of the entry, in the 1st area after the title proper, there should be only the name of the author which appears on the title page. It would be as shown below:

Battalion 999/Heinz G. Konsalik;
translated by Oliver Coburn.

The name chosen for the ME Access Point is known from outside source, therefore, it would go in the 7th area, i.e., the note area, according to the relevant rule in AACR2, 2.7B6, Statement of responsibility which states

"Make notes on variant names of persons or bodies if these are considered to be important"

The inclusion of the name known from outside source within square brackets with the word "i.e." is perhaps influenced by rules in CCC for the pseudonymous authors for the ME headings.

Case 3

MU Course Material BLIS. (AACR2)

The Main Entry as it appears on page 183 is :

"National Council of Applied Economic Research.
Utilisation of primary energy in India.
Bombay : Asia Pub., 1958.
iv, 67p. : ill.; 20 cm. - (Occasional papers; no. 3)";

EVALUATION OF COURSE MATERIALS OF CORRESPONDENCE COURSES

In case of Corporate Bodies (CB), particularly institutions, occupying the Access Points, either for Main or Added Entries, AACR2 in its rule 24.4 prescribes that some addition is to be made to the name of a CB as instructed in 24.4B - 24.4C. This is necessary for proper identification of the name by the users of the catalogue. CCC, too,

has similar rules.

Therefore, to provide sufficient identification, it is necessary to add to the heading, the name of the country, where it is located. The heading would, thus be

		'National Council of Applied Economic Research (India)'.
--	--	--

On page 201, two worked out Added Entries have been displayed, one is subject Added Entry and the other one is the Title Added Entry for the same book. In both the entries the headings are : 'cataloguing'. It is difficult for the students to learn that in such situations, the Title Added Entry is not necessary in a dictionary catalogue.

Case 4

IGNOU Course Material BLIS (CCC. Part 1)

The transcription of the title page of a book as printed on page 85 of the IGNOU CM, Part 1 on CCC is reproduced below:

Example 17

"Third Seminar/on/Dravidian Linguistics/Editors/S. Agesthialingam/and/S.V. Shanmugan/Annamalainagar/Tamilnadu. India/1972.

Other Information

Call no. P3p4411, N71 L2. ACC No. 4042. Date of publication 1972. Conducted by the Centre of Advanced Study in Linguistics, Annamalai University, Nov. 19-21".

The main entry (ME) provided for this book is

		"P3 p4411, N71 L2 DRAVIDIAN LINGUISTICS (Third Seminar on -) (Annamalainagar) (1971). [Proceedings]. Ed by S Agesthialingam and S V Shanmugam. Conducted by the Centre of Advanced Study in Linguistics. Annamalai University".
--	--	---

The explanation provided in the material is "Some explanation is required on the above worked out example. If the above seminar is a regular one, with fixed periodicity, it is to be treated as a periodical publication. In absence of such information

it is treated as a stray seminar.

No title is given in the title page and hence, it is treated as the proceedings of the seminar and rendered in square brackets. This is a case where an

entry to the sponsor of the seminar is called for. In the Main Entry, the sponsor is shown in the note section".

i) An examination of the explanation given *vis-a-vis* the rules in CCC reveals that i) Treatment of conference publications (CP) in CCC is in two different ways. If the CP is non-periodical (ad-hoc) one, it is to be treated as a Corporate Body (CB), whereas, if it is held periodically, it is to be treated as a periodical publication (PP). Apparently, the publication is the proceedings of the 'Third Seminar', though there is no indication that the seminar was not held subsequently. It may be possible that libraries may acquire either the proceedings of the 3rd seminar or all the three seminars. This

information regarding the holdings is taken care of in the 4th section of the ME in CCC.

The very presence of the word 'Third' in the beginning of the title page is adequate to treat this conference as a periodically held Conference and, therefore, it is better to treat this as a periodical publication according to CCC.

The CCC has provision of maintaining irregular periodical publications in the 3rd section of ME i.e., in the periodicity section. The concept 'stray seminar' is nowhere used in the CCC code.

Thus, the ME would better be done in the following way :

		P3, P4411, N71 L2 [Proceedings], DRAVIDIAN LINGUISTICS (Seminar on -). [Irregular.]. The library has V3 ; 1972.
--	--	---

ii) Second sentence (Part) of the periodicity section of the ME has been left blank for the non-availability of the required information.

iii) The ME provided in the material, considering the conference as a non-periodical one, and therefore, as a corporate author, is not helpful for the students to understand the true spirit of the rules of the code. Moreover, in the CM, the name of the sponsor has been shown in the note section to justify the preparation of a Book Index Entry under

the sponsor. But, it does not cite the relevant rule which permits to do this. CCC admits of only four kinds of notes (CCC. MFO) :

a) Series note, b) Extract note, c) Extraction note, d) Change - of - title note. The rule followed in this case is not clarified.

The existing rules (CCC MEO) permit only to write the name of the sponsor (i.e. collaborator), thus, the title section may be

		[Proceedings]. Ed by S Agesthalingam and S V Shanmugam; conducted by Centre of Advanced Study in Linguistics, Annamalai University.
--	--	---

EVALUATION OF COURSE MATERIALS OF CORRESPONDENCE COURSES

PRINTING MISTAKES - SOME CASE STUDIES

A good number of printing mistakes in these course materials in indentation, punctuation and capitalisation of rules are the most disturbing factors and stands in the way of understanding the subject. Utmost care is important in such courses, particularly, where a large number of students does not have the facilities of having interaction with the teachers.

AU BLIS Course Material Lessons 1-8 (AACR2)

Case 1

In page 4, "Rule 1.1 B 4 Long Title. A long title proper only if this can be done without loss of essential information".

The missing word (italicized below) is supplied from the code to make it meaningful.

"Abridge a long title proper" (AACR2 Rule 1.1 B 4).

Without the word it becomes meaningless.

Case 2

In page 5, "Shared Responsibility (two authors). For two or three authors in between the first and second mentioned author the connecting symbol is comma, 'eg., Statistical Methods of biologists/ S. Planichamy and M. Manoharan.'" Here, instead of ',' 'and' is given.

The difference between the rule and example creates confusion. Similarly, In the title proper 'Statistical Methods of biologists' in the 1st area 'm' of methodology, will be 'm' and not 'M' as printed in the CM.

Case 3

In page 5, "Cataloguer is also given more autonomy to supply word group 'and' but it should be enclosed in square brackets, eg., "Dark room/James Brown (and) Semour Lubertsky."

The rule says if 'and' is supplied in between two authors, the word 'and' is to be written within

square brackets. But, in the example provided, the word 'and' appears within circular brackets. Moreover, the word 'and' is not a 'word group', it is a single word.

Similar printing mistakes are also found in the MLIS Course Material, Lesson 9-16 of the AU.

MU BLIS Course Material (AACR2)

Case 1

"To satisfy this type of approach we prepare entry under the name of the author or principle author. This principle entry" (page 3, 3rd para, 6th line).

In the above quoted sentence the word 'principle' appears twice. The word should be 'principal'. On page 13 also the similar mistake occurs.

Case 2

In page 7, Six examples of Added Entries have been provided. In each example, there are mistakes on the use of capitalisation rules. The code prescribes that in the first area of description in the title part, if the title is in English, the first letter of the words will be capitalised only, if the words are proper nouns. And the first letter of the first word is to be capitalised as per rules of the English grammar. But, the examples provided illustrate otherwise, for example, 'Presenting the Library service' should be 'Presenting the library service'.

Case 3

- a) Page 34 shows an example as : "Opiter dicta [A. Birrell]".

It would be : Opiter dicta / [A. Birrell].

The 'slash' in between Title proper and Statement of Responsibility has not been shown.

- b) In page 35, an example has been printed as : "Developed Countries / U.K. Hicks[et al.]"

It would be "Developed countries / U.K. Hicks ... [et al.]".

IGNOU BLIS Course Materials (AACR2)

Compared to MU and AU, the course materials of IGNOU are better in printing, layout, size and also student friendly, though there are a few printing errors, in the main entry such as,

Case 1

At page 43, there should be ',' in between two authors instead of 'and' i.e., "Psychology of perception/William N. Dember and Joel S Warm" should be "Psychology of perception/William N. Dember, Joel S. Warm", as in the transcription of title page at page 42, there is no 'and'.

Case 2

Similarly, the added entry access points, in page 53, should be started from 2nd indention instead of 1st indention. Similar mistakes occur in other places also, such as on page 55.

Case 3

In page 66, in the contents note there is a mistake in capitalization of letters viz., 'computational psychology.....' should have been 'Computational psychology.....'. Further, the model example provided in the Code is clear, less clumsy, and easy to remember for the students, as well as more helpful for the users of a catalogue for whom the catalogue is prepared than the one provided in the course material.

CONCLUSION

In case of all the three universities - AU, IGNOU and MU, one commendable factor is that they are providing elaborate CMs in the form of separate books and booklets.

It is necessary that some immediate positive step to bring out a correct version of course material is

taken to facilitate correct understanding and interpretation of rules by all concerned.

The students who get the opportunity to attend the contact sessions may get assistance in overcoming the barriers to some extent, but for the rest of the students, who are the majority, the barriers will remain for ever.

REFERENCES

1. GORMAN (Michael) and WINKLER (Paul W). Anglo-American cataloguing rules. 2nd ed. revision. 1988. Canadian Library Education; Ottawa.
2. ANNAMALAI UNIVERSITY. Directorate of Distance Education. BLIS, paper VI: cataloguing practicals, part 1: AACR2, lessons 1-8.
3. ANNAMALAI UNIVERSITY. Directorate of Distance Education. MLIS, paper II: information processing practical, part 1: AACR2, lessons 1-8.
4. INDIRA GANDHI NATIONAL OPEN UNIVERSITY. School of Social Sciences. Library cataloguing practice: cataloguing practice using Classified Catalogue Code, - part 1; Revised ed. 1992. IGNOU; New Delhi.
5. RANGANATHAN (S R). Cataloguing practice, assisted by G. Bhattacharyya; 2nd ed. 1990. Sarada Ranganathan Endowment for Library Science; Bangalore.
6. RANAGANATHAN (S R). Classified catalogue code; assisted by A. Neelameghan - 5th ed. 1964. Asia Publishing; Bombay.
7. UNIVERSITY OF MADRAS. Institute of Correspondence Education. BLIS, paper VI: library cataloguing (written - practical): package 1: [CCC]. c 1991.

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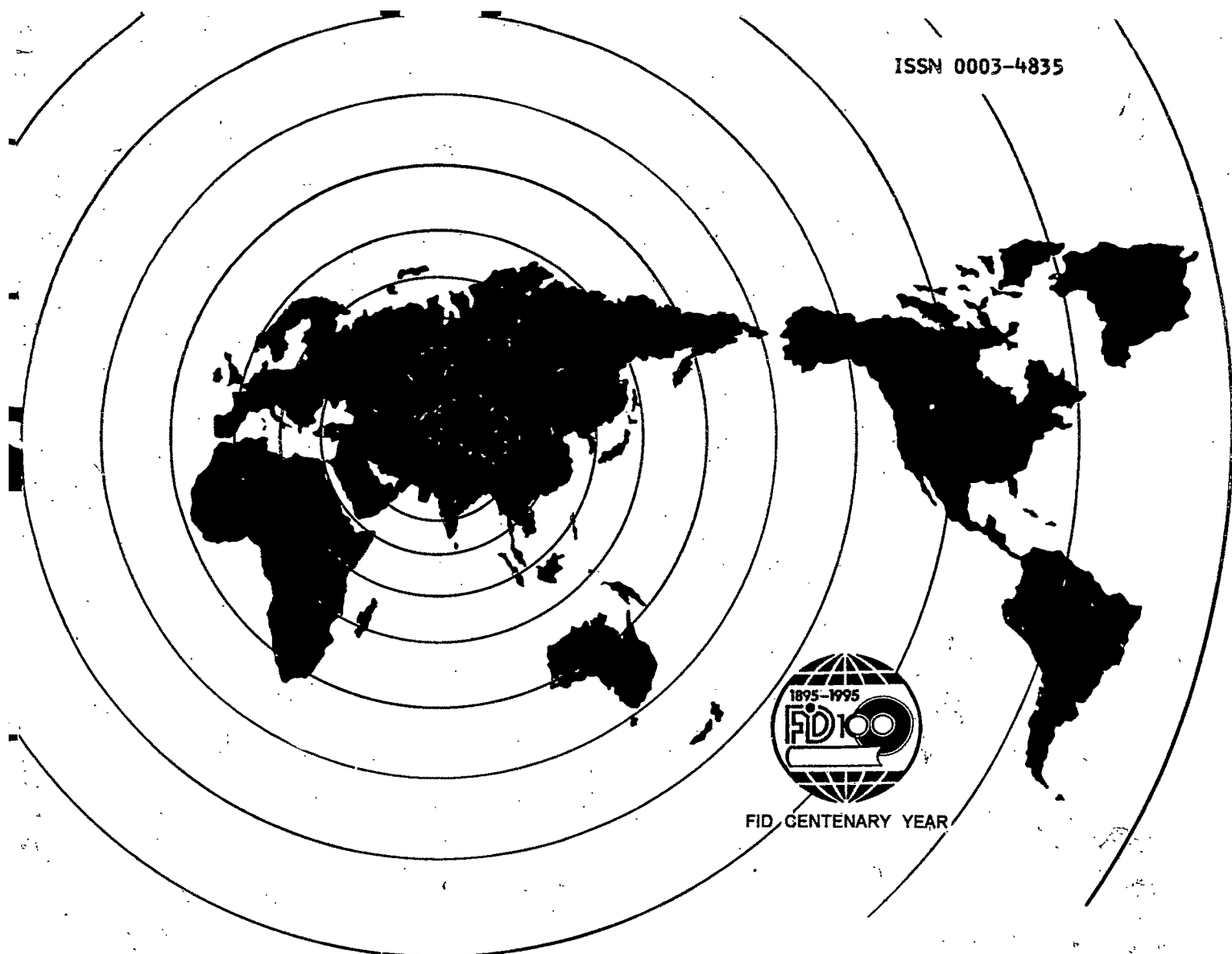
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A BIBLIOMETRIC STUDY OF THE JOURNAL OF OILSEEDS RESEARCH

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Analyses 498 research articles comprising 241 full length research papers and 257 short communications published during 1984 to 1992 in Journal of Oilseeds Research (vol. 1 - vol. 9) to find out (i) space allotment for full length research papers and short communications, (ii) authorship pattern, (iii) author productivity, (iv) prominent contributors, (v) important locations of oilseed research, (vi) pattern of tabular and graphical presentation, (vii) citation pattern, (viii) obsolescence of oilseed literature, (ix) Bradfordian distribution of citations, (x) important keywords figuring in the titles and (xi) time lag between the submission and publication of an article. Some of the important findings are: (i) the number of pages allotted per issue for full length papers as well as short communications vary widely, (ii) the single-authored papers account for only 12%, two-authored papers are found to be maximum and account for 39%, (iii) author productivity is in agreement with Lotka's law, especially, when the value of α is 2.07 and the number of papers is ≤ 5 , (iv) the places - Hissar, Rajendranagar (Hyderabad), Bangalore, New Delhi, Kanpur, Dhanbad, Ludhiana and Pantnagar are found to be the important areas of research in India and (v) on an average a full length research paper has 3 to 4 tables, and short communications 1 to 2 tables. No set pattern is observed in other types of graphic presentations. Important countries and highly cited journals have also been listed. Citations appended to articles do not follow Bradford's Law.

INTRODUCTION

William Carey, the doyen of Indian printing was possibly the first European to show great concern about the improvement of Indian agriculture. To the best of our knowledge it was he who contributed the first learned article on Indian agriculture in modern times. The article was devoted to the

state of agriculture in the district of Dinajpur, then forming part of Bengal, now Bangladesh, and published in 1808[1]. It was again Carey who was responsible for the establishment of the first agricultural society in India. The society, named Agricultural and Horticultural Society of India was established at Calcutta in 1820 with the objective of developing agricultural and horticultural resources of India [2]. Like other crops grown in India, oilseeds also attracted the attention of Europeans.

In the initial stages, articles on oilseeds appeared in various journals devoted to agricultural and other fields. It is only at the late 1880s, that availability of serials in the form of data periodicals devoted to oilseeds, e.g., *Forecast of the Linseed Crops (f.1887)*, *Report on the Linseed and Rapeseed Crops, North - Western Provinces (f.1889)*, *General Memorandum on the Sesamum (Til or Jinjili) India (f.1890)*, etc is noticed. However, a regular journal on oilseeds could not be noticed till the independence. In 1948, Bombay Oilseeds and Oil Exchange Limited started publishing the multilingual popular monthly called *Oils and Oilseeds Journal*. In mid-1950s several commodity committees were established under the auspices of Indian Council of Agricultural Research. One of the commodity committees, i. e. Indian Central Oilseeds Committee, started publishing from 1955 *Indian Oilseeds Journal*, and continued till 1965. This journal was in English and used to publish research articles, informative articles, notes and news, etc.

A research journal on the subject was awaited till 1980s. Almost one hundred years after the publication of the first serial on the subject, *The Journal of Oilseeds Research*, an organ of the Indian Society of Oilseeds Research emerged.

Indian Society of Oilseeds Research (ISOR) founded in 1983 is a registered society of individu-

als, organisations and institutions engaged in oilseeds research and development and vegetable oil technology in India. The foremost amongst its objectives is the promotion of research in various aspects of oilseed production.

The Journal of Oilseeds Research (JOR) is published half yearly since 1984. Articles from JOR are being regularly abstracted in *Field Crop Abstracts*, *INIS Atomindex*, *Irrigation & Drainage Abstracts*, *Soyabean Abstracts*, *Tropical Oilseed Abstracts*, *AGRINDEX* and *Biological Abstracts*. Currently, JOR is being circulated to the life members (151) and annual members (354). It publishes full length research papers and short communications in each issue.

OBJECTIVES

Nine volumes of JOR (1984-92) comprising 18 issues have been studied to find out:

- i) space allotment to full length papers and short communications;
- ii) authorship pattern;
- iii) author productivity;
- iv) prominent contributors;
- v) important locations of oilseed research;
- vi) pattern of tabular and graphical presentation;
- vii) citation pattern;
- viii) obsolescence of oilseed literature;
- ix) cited journals;
- x) Bradfordian distribution of citations;
- xi) keyword frequencies; and
- xii) time lag between the submission and publication of the article.

Normal count procedure [3] was used to generate data. The degree of collaboration [4], publication density, and publication concentration [5] were also calculated. Keywords figuring in the titles of the articles were counted to determine high frequency keywords.

The choice of the unit of analysis and of the initial set has a strong influence on the measures and results of any bibliometric study. Generally, authors are used when the study focuses on the influence of individuals, articles are used to study the influence of a particular idea contained in the article, key terms to follow an idea over time as it crosses

disciplines, and journals when the study focuses on the institutional embodiment of a discipline [6].

RESULTS AND DISCUSSIONS

Space allotment

The number of full length papers in an issue of JOR ranges between 8 and 20, with the mean of 13.4 and standard deviation 3.6. Twenty full length papers were published in 1989, in issue no. 1 of vol. 6. The number of short communications in an issue of JOR ranges between 8 and 25, with the mean of 14.2 and standard deviation 4.8. Twenty five short communications were published in 1987 in the third issue of volume 4.

The number of pages allotted per issue for full length papers ranges between 62 and 147 with the mean of 101 and standard deviation 27. 147 pages for ten full length papers were allotted in 1989 for issue no. 2 of vol. 6. The number of pages allotted per issue for short communications ranges between 23 and 82, with the mean of 49 and standard deviation 18. Eighty two pages were occupied by short communications in 1987 in issue no. 2 of vol. 4. Total number of pages per issue ranged between 87 and 196 with the mean of 148 and standard deviation 32.5. A full-length paper on an average occupied between 6.29 and 14.7 pages in an issue, with the overall mean of 7.6 and standard deviation 1.9. On an average, a short communication covered between 2.56 to 4.54 pages with an overall mean of 3.5 and standard deviation 0.4.

Authorship pattern

From Table 1, it appears that 12%, 39% and 29% papers are respectively single -, two -, and three authored. The rest of the papers (i.e. 20%) are jointly contributed by four and more authors. The maximum number of authors in a paper is found to be eight. The authorship pattern in the case of short communications closely follows the pattern of full length papers (Fig.1). 10%, 39% and 31% short communications are single -, two -, and three authored. The rest (20%) are the joint contributions of four, five and six authors. The collaboration coefficient is found to be 0.88 for full-length papers and 0.89 for short communications.

A BIBLIOMETRIC STUDY OF THE JOURNAL OF OILSEEDS RESEARCH

Table 1

Authorship pattern in Journal of Oilseeds Research

Vol.	Year	Papers	Number of papers under various authorships								Collabo- ration co- efficient
			One	Two	Three	Four	Five	Six	Eight	Total	
1.	1984	FP	2	5	7	3	-	-	-	17	0.88
		SC	-	10	6	5	-	-	-	21	1.00
2.	1985	FP	1	13	8	3	1	-	-	26	0.96
		SC	3	14	14	6	1	-	-	38	0.92
3.	1986	FP	3	8	7	4	3	-	-	25	0.88
		SC	4	9	9	5	2	-	-	29	0.86
4.	1987	FP	2	11	6	4	3	1	-	27	0.93
		SC	4	14	10	7	3	-	-	38	0.89
5.	1988	FP	3	9	10	2	2	-	1	27	0.89
		SC	2	14	9	6	1	-	-	32	0.94
6.	1989	FP	2	15	6	4	1	2	-	30	0.93
		SC	3	14	8	5	-	1	-	31	0.90
7.	1990	FP	6	6	7	1	3	1	-	24	0.75
		SC	1	8	8	2	-	-	-	19	0.95
8.	1991	FP	3	14	10	2	1	-	-	30	0.90
		SC	6	8	7	4	-	-	-	25	0.76
9.	1992	FP	7	14	10	3	1	-	-	35	0.80
		SC	3	8	9	4	-	-	-	24	0.88
TOTAL		FP	29	95	71	26	15	4	1	241	0.88
		SC	26	99	80	44	7	1	-	257	0.89
PERCENTAGE		FP	12.03	39.42	29.46	10.79	6.22	1.66	0.42	100.00	

The authorship pattern in various fields such as agriculture, anthropology, business and economics, counselling, education, finance, life sciences, medicine, and psychology [7-23] consistently show increase in the number of two - or more-authored papers. The increasing complexity of research, the

knowledge explosion combined with increased specialization and large, often interdisciplinary, projects have forced researchers to share their expertise. Recent studies on sugarcane [24], otolaryngology [25], agriculture [26] and nursing [27] also indicate similar pattern.

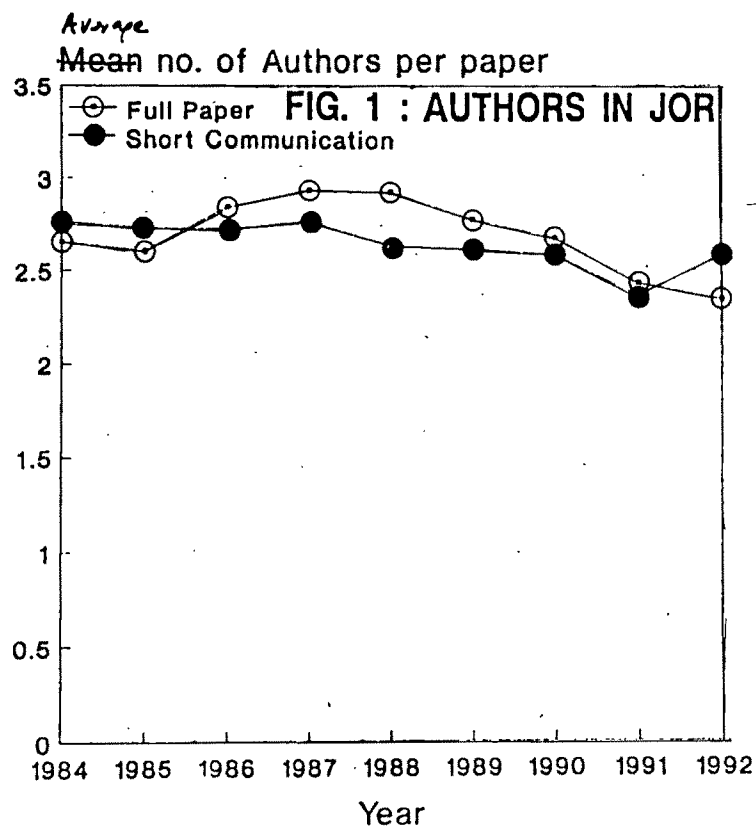


Fig. 1 : Authors in JOR

Author productivity

Table 2 indicates that 538 authors have one, 128 authors have two, 55 authors have three and 33

authors have four papers each to their credit. In the case of short communications also similar pattern emerges. Here 344 authors have one, 71 authors have two, 33 authors have three, and 19

Table 2

Author productivity in Journal of Oilseeds Research during 1984-1992 (All authors considered)

No. of papers (A)	No. of authors (B)	Percentage	Authorships (A x B)	Percentage
1	538	68.02	538	40.57
2	128	16.18	256	19.31
3	55	6.95	165	12.44
4	33	4.17	132	9.95
5	18	2.28	90	6.79
6	7	0.88	42	3.17
7	4	0.51	28	2.11
8	5	0.63	40	3.02
9	2	0.25	18	1.36
17	1	0.13	17	1.28
Total	791	100.00	1326	100.00

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authors have four short communications each to their credit. The maximum number of papers and short communications that go to the credit of an individual is found to be nine & eight respectively.

To what extent author productivity conforms to Lotka's law has also been tested. Table 2(a) shows the author productivity considering all the authors and also the first author only.

Table 2(a)

*Author productivity in Journal of Oilseeds Research during 1984-1992
(Only first authors considered)*

No. of papers (A)	No. of authors (C)	Percentage	Authorships (A x C)	Percentage
1	282	76.42	282	56.62
2	61	16.53	122	24.50
3	16	4.34	48	9.64
4	5	1.36	20	4.02
5	4	1.08	20	4.02
6	1	0.27	6	1.20
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
17	-	-	-	-
Total	369	100.00	498	100.00

According to Lotka's law

$$f(y) = \frac{A}{y^\alpha} \quad (i)$$

Where $f(y)$ stands for the authors producing y articles, and A and α are constants.

Considering the fact that 538 authors have produced one article each, the value of the constant

A can easily be derived.

Putting the value of $f(y)$, i.e., 538, and y , i.e., 1 in equation (i)

$$538 = \frac{A}{y^\alpha} = A$$

Now, taking the value of α as 2, the following results are obtained.

Table 2(b)

No of expected authors derived with the value of $\alpha = 2$

No. of papers	No. of authors (observed)	No. of authors (expected)
1	538	538
2	128	135
3	55	60
4	33	34
5	18	21
6	7	15
7	4	11
8	5	8
9	2	7

It may be observed from the table that the expected values are quite close to observed values as long as the number of paper does not exceed 5. Lotka's

law does not hold good beyond this number in this case.

Table 2(c)

No of expected authors derived with the value of $\alpha = 2.07$

No. of papers	No. of authors (expected)	No. of authors (observed)
1	538	538
2	128	128
3	55	55
4	31	33
5	19	18
6	13	7
7	10	4
8	7	5
9	6	2

In this case (Table 2(c)), practically an ideal match for the expected values and observed values upto 5 papers is observed, beyond which no match is observed.

Whether Lotka's law applies in case only the first authors of the articles are taken is also tested. As can be seen from Table 2(d), it does not.

A BIBLIOMETRIC STUDY OF THE JOURNAL OF OILSEEDS RESEARCH

Table 2(d)

No of expected authors derived with the value of $\alpha = 2$

No. of paper	No. of authors (expected)	No. of first authors (observed)
1	282	282
2	71	61
3	31	16
4	18	5
5	11	4
6	8	1

Prolific contributors

The most productive authors found in this study in order of the number of contributions are T P Yadava, Prakash Kumar, IJ Anand, A B Deokar, K

Giriraj, V J Patel, Hari Singh, S.P. Singh, IS Yadav, etc. (Table 3). Trofimenko opines that authors publishing only one or few papers during a life time can hardly contribute to the progress of science [28].

Table 3

Major contributors to Journal of Oilseeds Research

Sr.no.	Name	FP	SC	TA
1.	Yadava T.P.	9	8	17
2.	Deokar A.B.	4	5	9
3.	Kumar, Prakash	6	3	9
4.	Anand I. J.	4	4	8
5.	Giriraj K.	2	6	8
6.	Singh, Hari	4	4	8
7.	Singh S. P.	4	4	8
8.	Yadav I.S.	4	4	8
9.	Patel V. J.	4	3	7
10.	Rai M.	5	2	7
11.	Srivastava A.N.	4	3	7
12.	Yadav A.K.	4	3	7
13.	Hiremath, Shantha R.	2	4	6
14.	Labana K.S.	3	3	6
15.	Nagabhushanam G.V.S.	5	1	6
16.	Reddy B.N.	3	3	6
17.	Reddy P.S.	3	3	6
18.	Seenappa K.	3	3	6
19.	Seetharam A.	4	2	6

FP = Full Paper SC = Short Communications TA = Total Authorship

Locations of Research

Important locations where research on oilseeds were conducted are Hisar, Rajendranagar (Hydera-

bad), Bangalore, New Delhi, Junagarh, Kanpur, Dharwad, Ludhiana, Pantnagar, etc. (Table 4).

Table 4

Important locations of oilseeds research in India

LOCATION	ORGANISATION	FP	SC	TOTAL
Hissar	Haryana Agricultural University	21	21	42
Rajendranagar. (Hyd).	Directorate of Oilseeds Research, Andhara Pradesh	20	22	42
Rajendranagar. (Hyd).	Andhra Pradesh Agricultural University	15	22	37
Santoshnagar. (Hyd).	Central Research Institute for Dryl and Agr.	6	2	8
Patancheru. (Hyd).	International Crops Res Institute Semi-Arid Tropics	7	1	8
Bangalore	University of Agricultural Science	14	18	32
New Delhi	Indian Agricultural Research Institute	18	11	29
Kanpur	Chandra Sekhar Azad University of Agr. & Tech.	9	12	21
Dharwad	University of Agricultural Science	10	10	20
Ludhiana	Punjab Agricultural University	9	11	20
Pantnagar	G.B. Pant University of Agriculture & Technology	10	8	18
Jabalpur	Jawaharlal Nehru Krishi Vishwa Vidyalaya	8	8	16
Junagadh	Gujarat Agricultural University	4	10	14
Junagarh	National Research Centre for Groundnut	6	6	12
Kalyani	Bidhan Chandra Krishi Viswa Vidyalaya	9	5	14
Jalgaon	Mahatma Phule Agricultural University	7	6	13
Coimbatore	Tamil Nadu Agricultural University	4	8	12
Rahuri	Mahatma Phule Agricultural University	5	6	11
Parbhani	Marathwada Agricultural University	4	6	10
Bapatla	Andhra Pradesh Agricultural University	5	3	8

FP = Full Paper SC = Short Communications TA = Total Authorship

Fox [29] identified the following major factors influencing publication productivity of scientists - *psychological characteristics, work habits, age, environmental location, prestige of department or institution*. In her study institutional prestige emerged as one of the strongest correlates of publication productivity.

About 70% of China's research papers come from as few as 24 institutions, reflecting the centralised nature of the Chinese scientific enterprise. Laboratories under Chinese Academy of Sciences play a dominant role and only a few universities seem

to be active in scientific research [30].

Illustrations

Presentation pattern in JOR in terms of tables per paper (Fig.2) indicates full length papers have 3 to 4 tables and short communications 1 to 2 tables each. But presentation pattern in terms of figures and photographs is found to be highly fluctuating (Fig.3). During 1989 large number of visuals were found both for full length papers and for short communications.

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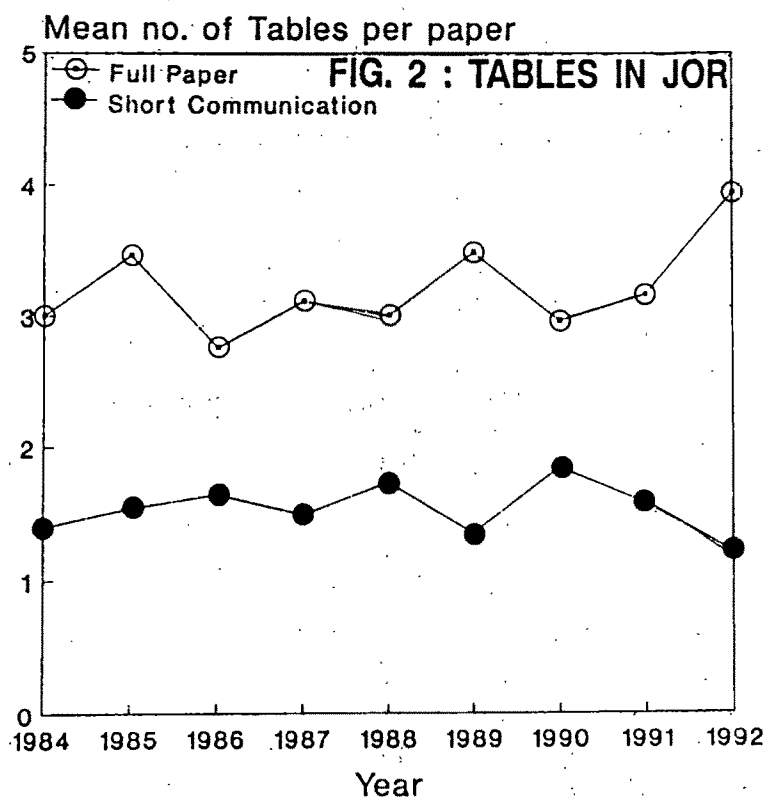


Fig. 2 : Tables in JOR

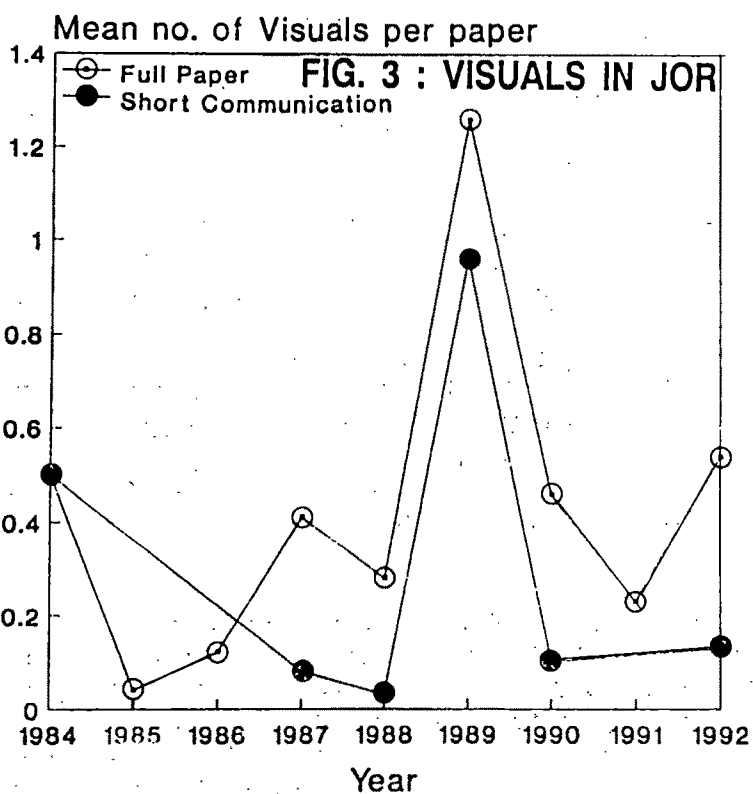


Fig. 3 : Visuals in JOR

References

Table 5 reveals that four full length papers and eight short communications are devoid of references.

Some authors cite a few most pertinent references whereas others are more thorough in their literature search. The small number of articles with no references at all possibly belong to a group of au-

Table 5

Citations in Journal of Oilseeds Research

Year	Papers	Number of papers with various citation ranges						
		0	1-5	6-10	11-15	16-20	21-	TOTAL
1984	FP	-	4	11	2	-	-	12
	SC	-	13	7	1	-	-	21
1985	FP	-	6	14	2	2	2	26
	SC	2	27	8	1	-	-	38
1986	FP	-	6	15	4	-	-	25
	SC	1	19	9	-	-	-	29
1987	FP	-	8	10	8	1	-	27
	SC	-	17	20	1	-	-	38
1988	FP	1	6	11	7	2	-	27
	SC	1	22	7	2	-	-	32
1989	FP	1	12	8	4	3	2	30
	SC	2	17	10	2	-	-	31
1990	FP	1	7	8	3	1	4	24
	SC	2	9	8	-	-	-	19
1991	FP	1	5	10	11	1	2	30
	SC	-	18	6	1	-	-	25
1992	FP	-	6	15	7	3	4	35
	SC	-	15	9	-	-	-	24
TOTAL	FP	4	60	102	48	13	14	241
	SC	8	157	84	8	-	-	257
PERCENTAGE FP		1.66	24.90	42.32	19.92	5.39	5.81	100.00
SC		3.11	61.09	32.69	3.11	-	-	100.00

FP = Full length paper and SC = Short Communication

thors who think that they are unique in their particular field. One can think of authors who simply do not want to admit that there exist other researchers in a particular field. Hence, they may be viewed as a different statistical population [31].

Sixty full length papers (24.90%) and 157 short communications (61.09%) have references in the

range 1 to 5. One hundred and two full length papers (42.32%) and 82 short communications (32.69%) have references in the range 6 to 10. 48 full length papers (19.92%), and 8 short communications (3.11%) have references in the range 11 to 16. The full length papers having references between 15 and 20 are only 13 (5.39%), and above 20 are only 14 (5.81%).

A BIBLIOMETRIC STUDY OF THE JOURNAL OF OILSEEDS RESEARCH

Short communications with more than 15 references have not been encountered in this study.

The trend for mean number of references per full length paper and short communications is given in

Fig 4. Rising trend observed in the mean number of references till 1990 in the case of full length papers starts declining afterwards. In the case of short communications uniform pattern around five references is noticed.

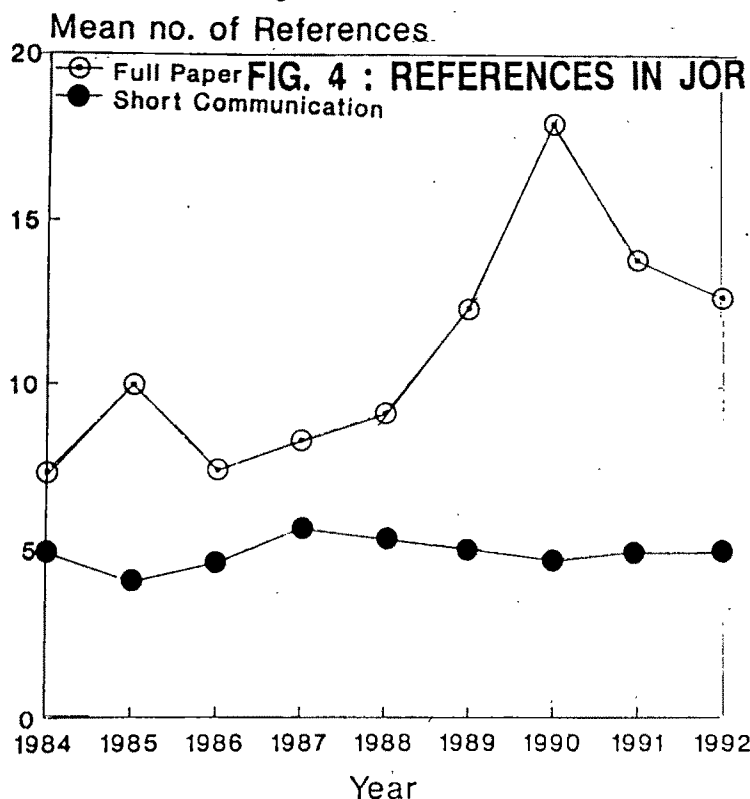


Fig. 4 : References in JOR

Large samples of papers published in *Journal of Biological Chemistry* (JBC) during 1910-85 were examined in order to study the referencing pattern, throughout the period 1910-85. All measures show that there has been a growth in the number of references per paper, during most of the period. However, the growth becomes prominent from 1950's onwards refuting Meadows "upper limit" [32].

It is difficult to foretell, but one may nevertheless anticipate that at some point of time the growth trend will eventually slow down, and enter a "saturation phase" in which the number of references per paper will grow much slower each year. One may readily assume that authors, perhaps pressed by editors, will strive to be more selective in the references they append to their paper and to impose a maximal limit to their number so that the

reference list remains in reasonable proportion compared to the main part of the paper. It may be assumed that the trend observed in the case of JBC are more or less true to most, if not all other journals in biochemistry.

Obsolescence

Table 6 indicates that 25 percent of latest literature belongs to immediate past 5.44 years in the case of full-length papers and 6 years in the case of short communications. Half-life period is found to be 10.11 years and 10.78 years for full length papers and short communications respectively. Seventy five percent of latest citations belong to last 18.44 years for full length papers and 19.33 years for short communications. Ninety percent of the cited literature belongs to the last 27-28 years. In the case of full length papers maximum age of citation is found to be 70 and that of short commu-

Table 6

Ages of citations and their percentages

Vol.	Year	Paper	Ages of Citations (Starting from 1st year)				
			Years				
1.	1984	FP	4	8	17	25	72
		SC	4	7	17	26	50
2.	1985	FP	5	10	20	27	75
		SC	6	9	15	25	48
3.	1986	FP	6	10	19	29	61
		SC	6	12	20	28	53
4.	1987	FP	6	12	21	31	57
		SC	7	12	20	27	57
5.	1988	FP	6	15	25	35	71
		SC	7	13	22	30	77
6.	1989	FP	5	9	17	30	77
		SC	7	11	19	28	56
7.	1990	FP	6	9	16	23	63
		SC	7	11	20	30	45
8.	1991	FP	6	10	16	24	68
		SC	5	11	20	28	51
9.	1992	FP	5	8	15	24	79
		SC	5	11	21	26	56

Percentage	25%	50%	75%	90%	100%
(Half Life)					
FP	5.44	10.11	18.44	27.55	69.22
SC	6.00	10.78	19.33	27.56	54.78

nications 55.

Sources cited in journals from the developing countries tend to be much older than those cited in the journals of the most developed nations. For example, in a sample of chemistry papers by Indians, 19-25% citations belonged to last five years. However, in American chemistry papers, 46-56% citations were of the last five years [34]. In an Indian journal on environmental sciences only about 14% of the sources cited were four years old or less, while 53% of the sources cited were more than ten years old. Comparable figures for an en-

vironmental journal published in a highly developed country were 32% and 27%. [35].

Journals Cited in JOR

Table 7 ranks the journals on the basis of citations received by them. Top ten journals in the descending order of citations received are: *Indian J. Agric. Sci.* (206), *Indian J Agron* (165), *Agron J* (139), *Crop Sci* (125), *Indian J Genet* (119), *Madras Agric J* (103), *J Oilseeds Res* (90), *Indian Farming* (52), *Pesticides* (51), and *Indian J Ent* (47). These ten journals account for 37.68% citations.

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Table 7

Ranked list of journals based on citations

Sr.no.	Titles	Citations	Cumulative citations	Percentage	Cumulative percentage
1.	Indian J. agric Sci	206	206	7.08	7.08
2.	Indian J. Agron	165	371	5.67	12.75
3.	Agron J	139	510	4.77	17.52
4.	Crop Sci	125	635	4.29	21.81
5.	Indian J. Genet.PI Br	119	754	4.09	25.90
6.	Madras Agric J	103	857	3.54	29.44
7.	J Oilseeds Res	90	947	3.09	32.53
8.	Indian Farming	52	999	1.79	34.32
9.	Pesticides	51	1050	1.75	36.07
10.	Indian J Ent	47	1097	1.61	37.68
11.	J. Maharashtra Agric Univ	47	1144	1.61	39.29
12.	Indian Phytopath	43	1187	1.48	40.77
13.	Indian Oilseeds J	40	1227	1.37	42.14
14.	J Res P.A.U.	38	1265	1.32	43.46
15.	Oleagineux	32	1297	1.10	44.56
16.	Crop Improvement	30	1327	1.03	45.59
17.	J.Indian Soc. Soil Sci.	29	1356	1.00	46.59
18.	Curr Sci	28	1384	0.96	47.55
19.	Mysore J. Agric Sci	27	1411	0.93	48.48
20.	Can J PI Sci	25	1436	0.86	49.34
21.	Oilseeds J.	25	1461	0.86	50.20
22.	Peanut Sci	25	1486	0.86	51.06
23.	Phytopathology	24	1510	0.82	51.88
24.	Expt Agric	23	1533	0.79	52.67
25.	Fert News	22	1555	0.76	53.43
26.	Plant Soil	22	1577	0.76	54.19
27.	H.A.U. J. Res	21	1598	0.72	54.91
28.	Plant Physiol	20	1618	0.69	55.60
29.	Genetics	20	1638	0.69	56.29
30.	J Am Oil Chem Soc.	20	1658	0.69	56.98
31.	Aust J Biol Sci	19	1677	0.65	57.63
32.	Indian J Agric Res	19	1696	0.65	58.28
33.	SABRAO J	19	1715	0.65	58.93
34.	J Econ Ent	18	1733	0.62	59.55
35.	Euphytica	17	1750	0.58	60.13
36.	Heredity	16	1766	0.55	60.68
37.	Indian Agriculturist	16	1782	0.55	61.23
38.	Pl. Dis Reprtr	16	1798	0.55	61.78
39.	J Agri Sci (UK)	15	1813	0.52	62.30
40.	JNKVV Res J	15	1828	0.52	62.82

(Contd.)

Table 7 (Contd.)

Sr.no.	Titles	Citations	Cumulative citations	Percentage	Cumulative percentage
41.	Theor Appl Genet	15	1843	0.52	62.34
42.	Aust J agric Res	14	1857	0.48	63.82
43.	Field Crop Abstr	14	1871	0.48	64.30
44.	Adv Agron	12	1883	0.41	64.71
45.	Indian J Pl Physiol	12	1895	0.41	65.12
46.	J Biol Chem	12	1907	0.41	65.53
47.	J Oil Tech Asan India	11	1918	0.38	65.91
48.	Pantnagar J Res	11	1929	0.38	66.29
49.	Sci Cult	11	1940	0.38	66.67
50.	Seed Sci Technol	11	1951	0.38	67.05
51.	Indian J Pl Prot	10	1961	0.34	67.39
52.	Indian J Weed Sci	10	1971	0.34	67.73
53.	Phytomorphology	10	1981	0.34	68.07
54.	Seeds Farms	10	1991	0.34	68.41
55.	Agri Res J Kerala	9	2000	0.31	68.72
56.	J Food Sci Tech Mysore Ind	9	2009	0.31	69.03
57-65	9 Jls with 8 papers each	72	2081	2.47	71.50
66-71	6 Jls with 7 papers each	42	2123	1.44	72.94
72-82	11 Jls with 6 papers each	66	2189	2.27	75.21
83-96	14 Jls with 5 papers each	70	2259	2.40	77.61
97-118	22 Jls with 4 papers each	88	2347	3.02	80.63
119-157	39 Jls with 3 papers each	117	2464	4.02	84.65
158-223	66 Jls with 2 papers each	132	2596	4.53	89.18
224-538	315Jls with 1 papers each	315	2911	10.82	100.00

Twenty one top journals account for 50 percent of the citations. The number of cited journals encountered in this study is 538. Citation density i.e. the number of papers cited/number of journals cited, is 5.41 in this case. Citation concentration i.e. number of journals containing half of the cited papers times 100/ total number of journals used, is 3.9 in the present case.

It looks rather strange that, in the ranked list, Journal of Oilseeds Research (JOR) figures only in the 7th place. Citations figuring in JOR, are in most cases, expected to be related to oilseeds. Hence, it is only natural that JOR should have topped the list. This does not happen mainly because JOR started only in 1984, and majority of the citations figuring in the journal pertain to pre-1984 era. Journal wise citations in JOR are depicted in Fig.5.

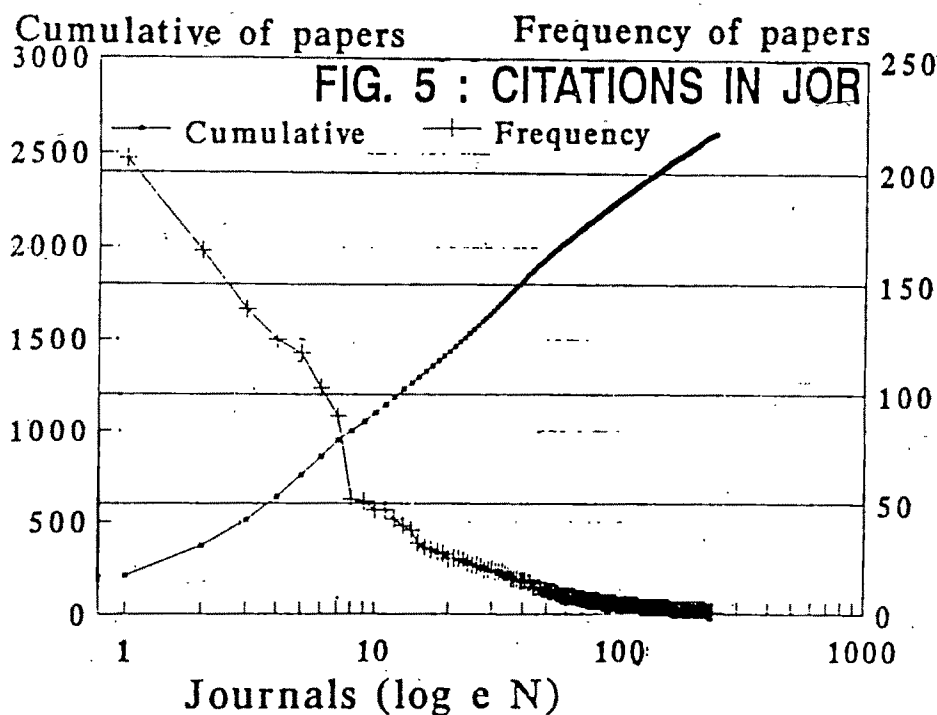


Fig. 5 : Citations in JOR

Table 8 provides further information on the journals cited in JOR like, year of starting of the journal, issues per year, circulation, impact factor and immediacy index wherever available, coverage in indexing and abstracting periodicals, and country of the publication. These data may be of help to serial librarians concerned with oilseeds literature acquisition and dissemination of oilseed information through CAS and SDI services [36-38].

Of the 56 frequently cited journals figuring in Table 8, 31 (55.35%) are Indian journals. Journals from USA rank next with a tally of 13(23.21%).

Impact factor and immediacy indices of Indian journals are very low. According to Sen and Lakshmi [39] about 500 Indian periodicals are being covered by international secondary services. JOR is also being covered by secondary services like,

Field Crop Abstracts, INIS Atomindex, Irrigation & Drainage Abstracts, Seed Abstracts, Soils & Fertilisers, Sorghum and Millets Abstracts, Soybean Abstract, Tropical Oil and Seeds Abstracts, and Indian Science Abstracts. Qualitywise also, Indian periodicals are faring quite well, compared to several developing and other countries. It is felt that more Indian periodicals deserve coverage by SCI, and the continuous reduction in the coverage of Indian periodicals is a matter of concern, since the poor coverage of Indian periodicals brings down their impact factor which, in turn, may bring down the coverage of Indian periodicals by international indexing and abstracting services, causing thereby a shadowing of Indian literature from international visibility. It has been suggested to relax criteria for inclusion in (SCI) for journals from second and third world countries to make SCI database really universal.

Table 8

Further information on first 56 journals figured in table 7

Sr.no.	Year of starting	Issues per year	Circulation	SCI JCR 1992		Coverage in I & A services	Country
				IF	II		
1.	1931	12	2,000	0.008	0.000	38	INDIA
2.	1956	04	1,500	0.000	0.000	23	INDIA
3.	1907	06	9,200	0.840	0.157	51	USA
4.	1961	06	7,300	0.630	0.168	39	USA
5.	1941	04	1,500	—	—	20	INDIA
6.	1911	12	750	—	—	30	INDIA
7.	1984	2	350	—	0.041	08	INDIA
8.	1951	12	51,200	—	—	32	INDIA
9.	1921	12	1,200	—	—	04	USA
10.	1939	04	—	—	—	14	INDIA
11.	1976	03	700	—	—	26	INDIA
12.	1948	04	1,725	—	—	22	INDIA
13.	1948	12	250	—	—	—	INDIA
14.	1964	04	—	—	—	19	INDIA
15.	1946	—	3,000	—	—	—	FRANCE
16.	1974	02	—	—	—	—	INDIA
17.	1953	04	2,100	—	—	20	INDIA
18.	1932	24	3,000	0.630	0.168	27	INDIA
19.	1967	04	600	—	—	33	INDIA
20.	1921	04	900	0.360	0.042	47	CANADA
21.	1969	04	300	—	—	03	INDIA
22.	1974	02	800	—	—	09	USA
23.	1911	12	4,558	2.008	0.350	44	USA
24.	1965	04	—	0.378	0.167	—	UK
25.	1956	12	4,000	—	—	15	INDIA
26.	1949	18	—	0.954	0.250	45	NETHER- LANDS
27.	1971	04	500	—	—	18	INDIA
28.	1926	12	5,400	2.925	0.455	39	USA
29.	1916	12	5,000	3.673	0.813	34	USA
30.	1924	—	—	0.983	0.129	—	USA
31.	1948	04	700	—	—	37	AUSTRALIA
32.	1967	04	1,500	—	—	25	INDIA
33.	1969	02	—	—	—	—	JAPAN
34.	1908	06	4,300	0.911	0.188	53	USA
35.	1952	24	1,750	0.351	0.119	28	NETHER- LANDS
36.	1947	06	—	1.236	0.398	32	UK
37.	1957	04	600	—	—	22	INDIA
38.	1977	12	—	—	—	—	USA
39.	1905	02	—	0.617	0.250	43	UK

Contd.

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Table 8 (Contd.)

Sr.no.	Year of starting	Issues per year	Circulation	SCI JCR 1992		Coverage in I & A services	Country
				IF	II		
40.	1967	04	500	—	—	13	INDIA
41.	1929	12	—	2.095	0.231	40	GERMANY
42.	1950	06	1,400	0.821	0.428	51	AUSTRALIA
43.	1948	—	—	—	—	—	USA
44.	1949	IRR	—	1.810	—	18	USA
45.	1958	04	600	—	—	09	INDIA
46.	1905	03	—	6.733	1.128	44	USA
47.	1969	04	1,500	—	—	03	INDIA
48.	1976	02	—	—	—	—	INDIA
49.	1935	12	2,000	—	—	16	INDIA
50.	1973	03	1,200	—	—	21	SWITZER- LAND
51.	1973	02	—	—	—	06	INDIA
52.	1969	04	—	—	—	—	INDIA
53.	1951	04	1,200	—	—	16	INDIA
54.	1975	12	—	—	—	—	INDIA
55.	1962	02	500	—	—	18	INDIA
56.	1964	06	2,500	0.059	0.000	28	INDIA

IF = Impact Factor, II = Immediacy Index, I & A = Indexing & Abstracting

* Determined following the method devised by B. K. Sen et al [42]

Serial nos. of this Table correspond to the serial nos of Table 7

Bradfordian Distribution of Cited Articles

Bradford law states that if a large collection of papers is ranked in order of descending productivity of journals (sources) relevant to a given topic, three zones can be marked off such that each zone pro-

duces one third of the total relevant papers [40].

The total number of cited articles found in the study is 2911. Each zone should account for roughly one-third of this number, i. e. 970. Table 9 depicts the number of articles in each zone with corre-

Table 9

Bradford distribution (three zones) of cited articles in Journal of Oilseeds Research

Zone	No. of journals	No. of cited articles
First	7	947
Second	42	993
Third	489	971
Total	538	2911

sponding number of periodicals. According to Bradford law the number of periodicals following successively in the three zones should be in the ratio $1 : \alpha : \alpha^2$. In this case it is 7:42: 489 i.e. 1 : 6: 81. The number of periodicals in the third zone far outnumbers the expected value, i. e. 252. Hence, it cannot be said that the distribution follows Bradford's law.

Key words

Keywords relating to oilseeds figuring in the titles of the full length papers and short communications have been arranged in the descending order of the frequencies (Table 10). This clearly pictures the scenario of oilseed research in India. For the last one decade, as can be seen, groundnut (i.e.

Table 10

Keywords related to Oilseeds having frequency > 5

Keywords	Frequency
Groundnut	33
Arachis hypogaea	20
Indian mustard	16
Brassica juncea	14
Mustard	13
Linseed	12
Sunflower	12
Castor	11
Safflower	11
Soybean	11
Sesame	10
Brassica campestris	9
Sesamum Indicum	6
Niger	5
Oilseeds	5

groundnut and Arachis hypogaea), tops the list with a tally of 53. Mustard (i.e. Indian mustard, Brassica juncea, mustard, and Brassica campestris) very closely follows groundnut with a tally of 52. Sesame (i.e. Sesamum and Sesamum Indicum), ranks third. Other oilseeds in the descending order of rank are linseed, sunflower, castor, safflower, soybean and niger.

Time Lag

The main criticism of the scientific journal stems from the evergrowing timelag between the submission of the manuscript and its publication in the

journal. [40].

The time lag in the case of JOR has been fluctuating for both full length papers and short communications (Fig 6.) Higher time lag was found during 1990. In this journal, by and large, the time lag between the receipt of the paper and its final publication is found to be about one year.

In order to further reduce the time lag, JOR may be made quarterly. By doing so JOR can attract high quality research papers of those authors who rush to publish in other monthly and quarterly journals, so as to get their papers published quickly.

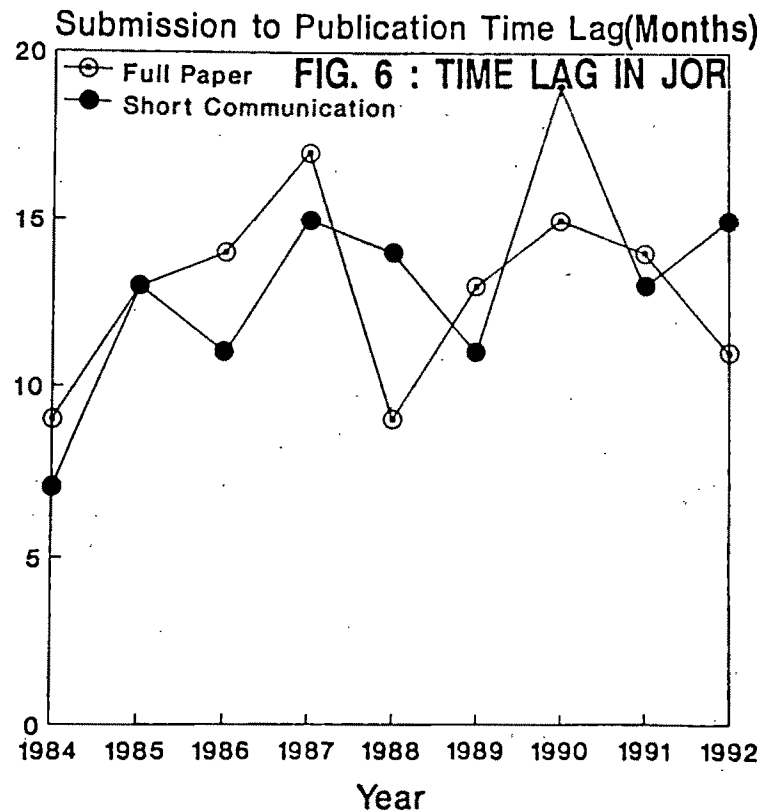


Fig. 6 : Time Lag in JOR

CONCLUSION

Compared to international standards, the quality of Indian journals is poor, and agricultural journals poorer. JOR is also no exception to the rule, though its impact factor (.041) is comparatively higher than the impact factors of other Indian agricultural journals [42]. The reasons for their poor quality among others are:

- (i) lack of rigorous refereeing;
- (ii) lack of international representation in the editorial board;
- (iii) lack of foreign contributions;
- (iv) lack of good papers. Good papers by Indians are normally published in high standard foreign journals;
- (v) poor circulation and lack of foreign subscription. This reduces the visibility of the paper in the international arena substantially;
- (vi) lack of dedicated workers to run the journal;

- (vii) inadequate financial resource;
- (viii) lack of timeliness in publication; and
- (ix) poor quality paper, printing & binding etc, for example, 98 articles published in vol. 7 and 8 of JOR have not been cited even once in the journals covered by Science Citation Index, thereby, international visibility of the journal is practically zero. JOR also suffers from many of these short-coming. Journals on oilseed research are not very many in the world. JOR has ample scope to be developed into an internationally important journal. It has to broaden its outlook and put in little more efforts to remove some of the maladies.

REFERENCE

1. CAREY (W). Remarks on the state of agriculture in the district of Dinajpur. *Asiatick Researches*. 1808; 10; 1-26.

2. BURKILL (I H). Chapters on the history of botany in India. 1965.
3. PRAVIDIC (N) and OLUIC-VUKOVIC (V). Dual approach to multiple authorship in the study of collaboration/scientific output relationship. *Scientometrics*. 1986; 10, 5-6; 259-280.
4. SUBRAMANYAM (K). Bibliometric studies of research collaboration: a review. *J Info Sci*. 1983; 6, 1; 33-38.
5. VINKLER (P). Bibliometric analysis of publication activity of a scientific research institute. *Informetrics*. 89/90; 1990; 309-334.
6. BORGMAN (C L) and RICE (R E). Convergence of information science and communication: a bibliometric analysis. *J Am Soc Info Sci*. 1992; 43, 6; 397-411.
7. BURMAN (K D). Hanging from the masthead: reflection on authorship. *Ann Internal Med*. 1982; 97; 602-605.
8. MENDENHALL (M) and HIGBEE (K L). Recent trends in multiple authorship in psychology. Paper presented at the Annual Meeting of the Western Psychological Association, Sacramento, CA. 1982, P6 (ERIC ED 222 807).
9. PETRY (G H) and KERR (H S). Pressure to publish increases incidence of co-authorship. *Phi Delta Kappa*. 1982; 63; 495.
10. STRAHAN (R F). More on JCP publication: single versus multiple authorship. *J Counseling Psychol*. 1982; 29; 430-431.
11. SCHWESER (C). Economics of academic publishing, *J Econ Educ*. 1983; 14; 60-64.
12. SENGUPTA (I N). Planning of national information system. *Int Lib Rev*. 1983; 18; 81.
13. DE VILLIERS (F R R). Publish or perish-the growing trend towards multiple authorship, *SA Med J*. 1984; 66; 882-883.
14. FARR (A D). Multiple authorship of scientific papers. *Med Lab Sci*. 1984; 41, 1; 1-2.
15. GLADDING (S T). Multiple authorship in the Personnel and Guidance Journal : a 12 year study. *Personel & Guidance Journal*. 1984; 62; 628-630.
16. SACCO (W P) and MILANA (S). Increase in number of authors per article in ten APA journals : 1960-1980. *Cognitive Ther Res*. 1984; 8; 77-84.
17. LYLE (S P). Multiple authorship in volumes 1 through 22 of the Journal of Industrial of Teacher Education. *Journal of Industrial Teacher Education*. 1986; 24; 105-108.
18. ZOOK (A). Trend towards multiple authorship : update and extension. *J Counselling Psychology*. 1987; 34; 77-79.
19. BELGUM (K J) and SAMI (L K). Research collaboration in agricultural science. *Int Lib Rev*. 1988; 20; 57-63.
20. CHOI (J M). Analysis of authorship in anthropology journals, 1963 & 1983. *Behaviour Soc Sci Libn*. 1988; 6; 85-94.
21. POWERS (R D). Multiple authorship, basic research, and other trends in the emergency medicine literature (1975 to 1986). *Am J Emergency Med*. 1988; 6; 647-650.
22. SATYANARAYANA (K) and RATNAKAR (K V). Authorship patterns in life sciences, preclinical and clinical research papers. *Scientometrics*. 1989; 17, 3-4; 363-371.
23. SWAFFORD (G L). Window or mirror ? a content analysis of the first 25 years of the Journal of Educational Administration. *Journal of Educational Administration*. 1990; 28; 5-23.
24. KALYANE (V L) and VIDYASAGAR (R K). Collaboration trends in sugarcane research - A case study. *Ann Lib Sci Doc*. 1991; 39, 1; 9-11.

A BIBLIOMETRIC STUDY OF THE JOURNAL OF OILSEEDS RESEARCH

25. ROSENFELD (R M). Clinical research in otolaryngology journals. *Arch Otolaryngol Head Neck Surgery*. 1991; 117; 164-170.
26. MUNSHI (U M). Research collaboration in agricultural sciences. *ILA Bull*. 1993; 28, 3-4; 57-60.
27. NORRIS (R P). Authorship patterns in CJNR : 1970-1991. *Scientometrics*. 1993; 28, 2; 151-158.
28. TROFIMENKO (A P). Scientometric analysis of the development of nuclear physics during the last 50 years. *Scientometrics*. 1987; 11, 3-4; 231-250.
29. FOX (M F). Publication productivity among scientists : a critical review. *Soc Stud Sci*. 1983; 13; 285.
30. ARUNACHALAM (S), SINHA (R) and SINGH (U N). Sleeping dragon wakes up : a scientometric analysis of the growth of science and the usage of journals in China. *Curr Sci*. 1993; 65, 11; 809-822.
31. SICHAEI (H S). Note on a strongly unimodal bibliometric size frequency distribution. *J Am Soc Info Sci*. 1992; 43, 4; 299-303.
32. YITZHAKI (M). Number of references in biochemistry and other fields-a case study of the Journal of Biological Chemistry throughout 1910-1985. *Scientometrics*. 1991; 21, 1; 3-22.
33. BURTON (R F) and KEBLER (R W). 'Half Life' of some scientific and technical literature. *Am Doc*. 1960; 11; 18.
34. MUNSHI (U M), KARANJAI (A) and SEN (B K). Citation behaviour of chemical scientists - a case study. *ILA Bull*. 1991; 27, 2; 47-53.
35. ARUNACHALAM (S). Are citation-based quantitative techniques adequate for measuring science on the periphery? *Scientometrics*. 1989; 15, 5-6; 393-408.
36. SENGUPTA (I N). Choosing microbiology periodical : study of the growth of literature in the field. *Ann Lib Sci Doc* 1974. 21, 3; 95-111.
37. SENGUPTA (I N) and Ghosh (B N). Role of bibliometry in journal selection & library management. *IASLIC Bull*. 1990; 25, 2; 87-92.
38. MOLINE (S R). Mathematics journals : impact factor and cents per thousand characters. *Serial Librarian*. 1991; 20, 4; 65-71.
39. SEN (B K) and LAKSHMI (V V). Indian periodicals in the Science Citation Index. *Scientometrics*. 1992; 23, 2; 291-318.
40. BRADFORD (S C). Documentation. 1948. Crosby Lockwood; London.
41. JAJE (K B) and CHAKRABARTI (A K). Publishing in metallurgy-quo vadis. In Proceedings of the Seminar on Primary Communication in Science & technology, Bangalore, 4-8 Dec. 1978. Publications & Information Directorate. New Delhi. PP. 91-97.
42. SEN (B K), KARANJAI (A) and MUNSHI (U M). Method for determining the impact factor of a non-sci journal. *J Doc*. 1989; 45, 2; 139-41.

THE INFLUENCE OF AGE AND WORK EXPERIENCE ON PUBLICATION OUTPUT AMONG LIBRARIANS IN NIGERIAN UNIVERSITIES

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The influence of age and work experience on publication output among librarians in Nigerian universities were studied. A stratified random sampling method was used to select 278 librarians working in 22 out of the 35 university libraries in Nigeria. One-way analysis of variance statistics (ANOVA) was used to compare librarians from different age and work experience brackets regarding their publication output. The results of empirical analysis indicate that librarians' age and work experience have positive influence on their publication output. The paper, therefore, recommends that librarians who are professionally matured and experienced on the job should be recruited and be given preferential treatment in the work environment to enhance publication productivity. However, the younger and less experienced ones should be encouraged to publish to enhance continuity and knowledge base in the profession.

INTRODUCTION

The literature of any field forms the bedrock of that discipline and should be properly organised for easy retrieval by users [3]. However, some important characteristics of the producers such as, sex, age, work experience, professional experience, educational background and position held, should be carefully investigated by researchers. This could assist university authorities in personnel recruitment and development exercises.

Publications enhance the extension of frontiers of knowledge in the profession. Publishing gives national and international visibility, status, rank and positions to the writer. Again, it may be argued that librarians publish due to professional experience and interest which is good for knowledge base.

Several research studies, as shown in the library science literature, have indicated the justification for librarians to publish [9, 5, 11, 8, 6, 10].

The influence of age and work experience in librarianship could elicit assessment of publication output among librarians in Nigerian universities. With the recent focus on specialization in academics of university environment, there has been increasing interest in examining a specific form of deviation, particularly age and work expertise in publication output [7]. A study of the influence of age and work experience on publication output is significant in that it could help library management in various way.

LITERATURE REVIEW

Olsgaard and Olsgaard [16] observed that the stock in trade in librarianship was communication and transfer of ideas within the profession. The authors concluded that librarianship was sadly behind the disciplines of economics, psychology and the sciences in determining the bibliometric nature of the professional literature.

Watson [19] studied publication output of librarians at ten large university libraries in USA to suggest norms of publication productivity for the profession. From his research findings, the following conclusions were arrived at.

- (a) As regards age influence on publication productivity, age is not a strong determinant of publication productivity. However, the most productive librarians appear to be between the ages of 40 and 44 years and publication output does not drop off with increasing age;

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- (b) The first 2 or 3 years of professional life should be discounted as potentially productive publication years.

Harvey [9] who pioneered the study of publication activity and advancement in the library profession observed that the older librarians published more than the young ones. In the Nigerian setting, Nwafor [14] studied how much publishing was done by Nigerian librarians, with a small sample of 39 librarians selected from three libraries. His research findings showed that the greatest number of publications came from those who were of 50 years and above. With regards to work experience, Watson [19] and Nwafor [14] noted "that professional maturity is a more potent prediction of publication output". However, it seems that no empirical study has been done to really determine the influence of age and work experience on publication output among librarians in Nigerian universities who are academic staff members.

In the Nigerian setting, the study of different aspects of literature of librarianship [1, 15, 17, 14, 3, 7] had been subjected to research, especially as regards the trend and characteristics of the authors. Unfortunately, none of the works cited above examined the influence of age and work experience on publication productivity.

Afolabi [1] pioneered the study on bibliometrics of the literature of librarianship in Nigeria from 1950-1973. He [2] compared author collaboration in the periodical literature of library and information science in Nigeria with those of U.K. and U.S.A. Nwafor [14] examined Nigerian librarians and publishing and considered the effects of such factors as rank, types of libraries and academic qualification. Aina [3, 4] examined the characteristics of African authors of periodical literature of three international library journals with respect to status, types of libraries, time span of cited literature, etc. He also compared papers in foreign and local journals in terms of quality. His findings revealed that there was no significant difference in quality between the two categories. Edem [7] examined the relationship between job satisfaction and publication output among librarians in Nigerian universities and observed that job satisfaction did not have positive relationship with publication. In the Nigerian setting, publication records, e.g., journal, articles, textbooks, accepted conferences and work-

shop papers as well as indexes, abstracts and bibliographies compiled and published by librarians are the significant criteria of productivity and effectiveness in terms of personal performance indicators in university libraries. Apparently, this is similar to American universities trend where faculty status for librarians is a major issue.

In respect of the university, Rayman and Goudy [18] argued that for all librarians working in university libraries, irrespective of sex, age, work experience and academic qualifications, the task to publish would be a difficult exercise. In a similar study, Mitchell and Swieszkowski [13] upheld this conclusion about librarians in university libraries. In testing these assertions, this paper examines the influence of age and work experience on publication among librarians in Nigerian universities. For the present study, four hypotheses, stated, were,

- a) There is no significant difference in age on librarians' academic publication output in Nigerian universities;
- b) There is no significant difference in age on librarians' work related publication output in Nigerian universities;
- c) There is no significant difference in work experience on librarians' academic publication output in Nigerian universities; and
- d) There is no significant difference in work experience on librarians' work related publication output in Nigerian universities.

For the purpose of clarity, publication output survey statistics were categorised into two dimensions - *academic publication output* i.e. journal, articles, books, accepted or published conference/workshop papers and *work related publication output* i.e. , abstracts, indexes and bibliographies plus in-house publications. Such academic and work related publication output were assumed to have local, national and international book/serial numbers - ISBN or ISSN.

METHODOLOGY

A stratified random sampling method was used to select 278 librarians working in 22 out of the 35 university libraries in Nigeria. All the universities were categorised into five groups consisting of (a) federal universities (conventional), (b) universities of agriculture, (c) State universities, (d) State

universities of technology, and (e) federal universities of technology. The university names/status were used as a major criterion for belonging to a group and the asterisked ones as shown in *Appendix* were randomly selected for the study. Furthermore, a simple random sampling method was used to select universities from each of the five groups for the study. However, the geographi-

cal location of universities was taken into consideration during selection. The essence of these two sampling methods was to ensure equal probability of being selected. Finally, all available librarians in the sample population were given questionnaire irrespective of sex, age, status, work experience, years and academic qualifications.

Table 1

Classification of librarians by age

Sl.no.	Ages of librarians	Frequency	Valid percent
1.	Below 30 years	12	5.94
2.	Between 31-34 years	32	15.84
3.	Between 35-39 years	39	19.30
4.	Between 40-44 years	38	18.81
5.	Between 45-49 years	40	19.80
6.	Above 50 years	38	18.81
7.	No response	3	1.48
	Total	202	100.00

202 librarians filled and returned their questionnaires correctly representing 72.60% response rate which was adequate for empirical analysis (Table 1)

Six major age brackets were identified and used for the study analysis. The results obtained from

the respondents show that the highest number of librarians fall within the age brackets of 45-49 years which was 40; followed by 39 librarians who were within the age brackets of 35-39 years; 38 librarians within 40-44 years and 50 years & above came third position with 38 librarians.

Table 2

Classification of librarians by work experience

Sl.no.	Work experience brackets	Frequency	Valid percent
1.	Below 30 years	12	5.94
1.	Below 5 years	35	17.32
2.	Between 6-9 years	44	21.78
3.	Between 10-14 years	35	17.32
4.	Between 15-19 years	49	24.25
5.	Above 20 years	38	18.81
6.	No Response	1	0.49
	Total	202	100.00

THE INFLUENCE OF AGE AND WORK EXPERIENCE ON PUBLICATION OUTPUT

Five work experience brackets were identified and used for the study analysis. The results (Table 2) obtained showed that the highest number of 49 librarians had between 15-19 years of work experience, followed by 38 librarians who had 20 years and above work experience and 44 librarians had between 6-9 years of work experience. The fourth and fifth positions went to librarians with 10-14 years and those with below 5 years of work experience respectively.

The respondents were requested to check on a six point scale to express their level of publication output within the past eight years 1985-1993, thus: 1) None; 2) 1-3; 3) 4-7; 4) 8-11; 5) 12-15; 6) 16 and above number of publications. Quantitative values were attached to the responses in the questionnaire as indicated above and the means of responses were computed for each publication output dimension using the appropriate statistical package for the social sciences (SPSS) computer programme. In determining the influence of age

and work experience years on publication output, a one-way analysis of variance statistics (ANOVA) was used to compare the difference of the mean scores of the different age and work experience brackets with regard to their publication output.

Furthermore, the mean and standard deviation scores of the publication output dimensions were computed and used in determining the study results. The calculated f-value ratio was used to really determine the age and work experience brackets which had the greatest influence on publication output. The four null hypotheses stated above were tested at the 0.05 level of significance.

ANALYSIS OF DATA

in testing hypothesis 1, one-way analysis of variance statistics (ANOVA) was used to compare librarians from six different age brackets regarding their academic publication output dimension in Nigerian universities (Table 3).

Table 3

Analysis of variance : influence of age on librarians' academic publication output

Groups	Age brackets	N	$\bar{X}$	SD
1.	Below 30 years	12	3.5000	1.4460
2.	Between 31-34 years	30	4.0333	1.7905
3.	Between 35-39 years	39	4.9231	1.8120
4.	Between 40-44 years	35	4.4857	1.8688
5.	Between 45-49 years	32	5.6875	2.4552
6.	Above 50 years	35	6.3143	2.7629
	Total	183		

Analysis of Variance

Sources of variation	df	SS	MS	F
Between Groups	5	140.1034	28.0207	6.1542*
*Within Groups	177	805.8966	4.5531	
Total	182	946.0000		

*P> 0.05; df = 5,177; Critical F = 2.27

The result of analysis of variance (Table 3) shows that the calculated F value of 6.1542 is higher than the critical F value of 2.27 at 5,177 degree of freedom. This means that librarians' age has significantly influenced their academic publication output ($P > 0.05$; $df = 5,177$; $F = 6.1542$). Therefore, the null hypothesis stating that there is no significant difference in age on librarians' academic publication output in Nigerian universities is rejected.

Furthermore, librarians who are over 50 years old tend to produce more academic publications (Mean = 6.3143), followed by those who are be-

tween the ages of 45-49 years (mean = 5.6875) and those within the age range of 35-39 years (mean = 4.9281). Indeed, more academic publications are produced by the older librarians when compared with the younger ones. It has also been affirmed that work experience influences professional output of librarians [12].

In testing hypothesis 2, one-way analysis of variance statistics (ANOVA) was used to compare librarians' from six different age brackets regarding their work related publication output dimension in Nigerian universities (Table 4).

Table 4

Analysis of variance: influence of age on librarians' work related publication output

Groups	Age brackets	N	$\bar{X}$	SD
1.	Below 30 years	7	4.1429	0.3780
2.	Between 31-34 years	14	5.3571	1.8232
3.	Between 35-39 years	13	5.7692	1.4233
4.	Between 40-44 years	17	4.4706	0.6243
5.	Between 45-49 years	11	5.0909	0.8312
6.	Above 50 years	10	6.1000	1.8529
	Total	72		

Analysis of Variance

Sources of variation	df	SS	MS	F
Between Groups	5	29.5765	5.9153	3.4727*
Within Groups	66	112.4235	1.7034	
Total	71	142.0000		

* $P > 0.05$; $df = 5,66$; Critical $F = 2.36$.

The result of analysis of variance (Table 4) shows that the calculated F value of 3.4727 is higher than the critical F value of 2.36 at 5,66 degree of freedom. This means that librarians' age has signifi-

cantly influenced their work related publication output (* $P > 0.05$; $df = 5,66$; $F = 3.4727$). Therefore, the hypothesis stating that there is no significant difference in age of librarians' work related publication output in Nigerian universities is rejected.

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From the results above, those with the highest work related publication output are above 50 years as indicated with (means = 6.1000), followed by those within the age bracket of 35-39 years (mean = 5.7692), followed by those within the age bracket of 31-34 years (mean = 5.3571). The lowest came from those who are under 30 years (mean =

4.1429).

In testing hypothesis 3, one-way analysis of variance statistics (ANOVA) was used to compare librarians from five work experience brackets regarding their academic publication output dimension in Nigerian universities (Table 5).

Table 5

Analysis of variance: influence of work experience on librarian's academic publication output

Groups	Work experience	N	$\bar{N}$	SD
1	Below 5 years	35	3.9143	1.5410
2	Between 6-9 years	41	4.3171	1.6346
3	Between 10-14 years	31	5.6774	2.1662
4	Between 15-19 years	44	4.8864	2.3939
5	Above 20 years	32	6.5625	2.6511
	Total	182		

Analysis of Variance

Sources of Variation	df	SSSS	MS	F
Between Groups	4	153.2981	38.3245	8.6057*
Within Groups	178	792.7019	4.4534	
Total	182	946.0000		

* $P > 0.05$; $df = 4, 178$; Critical $F = 2.43$

The result of analysis of variance (Table 5) shows that the calculated F value of 8.6057 is greater than the critical F value of 2.43 at 4,178 degree of freedom. This means that librarians' work experience have significantly influenced their academic publication output (* $P > 0.05$; $df = 4, 178$; $F = 8.6057$).

Therefore, the null hypothesis stating that there is no significant difference in work experience on librarians' academic publication output in Nigerian universities is rejected. This also shows that librarians who have worked above 20 years have pro-

duced more academic publications with (mean = 6.5625), followed by those who have worked between 10-14 years with (mean = 5.6774). The lowest academic publications came from those who have worked below 5 years with mean = 3.9143.

In testing hypothesis 4, one-way analysis of variance statistics (ANOVA) was used to compare librarians from five work experience brackets regarding their work related publication output dimension in Nigerian universities (Table 6).

Table 6

Analysis of variance: influence of work experience on librarians' work related publication output

Groups	Work experience	N	$\bar{X}$	SD
1	Below 5 years	16	4.4375	0.6292
2	Between 6-9 years	16	5.5000	1.7889
3	Between 10-14 years	11	5.4545	1.2933
4	Between 15-19 years	20	5.2000	1.5424
5	Above 20 years	9	5.4444	1.3333
	Total	72		

Analysis of Variance

Sources of variation	df	SS	MS	F
Between groups	4	11.9130	2.9783	1.5339
Within groups	67	130.0870	1.9416	
Total	71	142.0000		

df = 4,67; Critical F = 2.51

The result of analysis of variance (Table 6) shows that the calculated F value of 1.5339 is less than the critical F value of 2.51 at 4,67 degree of freedom. This means that librarians' work experience do not significantly influence the librarians' work related publication output (df = 4,67; F = 2.51). Therefore, the null hypothesis stating that there is no significant difference in work experience on librarians' work related publication output in Nigerian universities is accepted.

A significant trend of the study results show that, those with 6-9 years work experience produced more publications when compared with the older librarians (mean = 5.5000), followed by librarians who have between 10-14 years work experience with (mean = 5.4545).

DISCUSSION OF RESULTS

One of the study results is that librarians' age difference has significantly influenced both their aca-

demic and work related publication output. The result shows that academic publication output are more produced by the older librarians than the younger ones. This results supports findings of others [9, 19, 14] which reveal that the most productive librarians in terms of publishing are those "over forty years old and above and does not drop off with increasing age."

The result could be explained by the fact that such librarians are more matured and have been exposed to a lot of literature, information - research knowledge and presentation that would enable them share experience with others through publishing. More so, the older librarians may have grasped the technique of writing for publishing having read widely for years while on the job.

Another plausible reason for this result is that at this point, the "mental attitude" of the librarians would have been geared towards publishing because without it, they cannot be advanced or pro-

THE INFLUENCE OF AGE AND WORK EXPERIENCE ON PUBLICATION OUTPUT

moted on the job. Consequently, this attitude makes them to be professionally matured and prepared for writing good articles for publications. As a result, age was noted to be a very relevant force for publication output among the librarians studied.

In respect of work experience, the study result has shown that librarians' work experience have positive influence on their publication output. This result has been supported by results of previous studies indicated by Watson [19] who observed that "professional maturity is a more potent predictor of publication activity".

With the above results, one can state without contradiction that professional maturity comes with some years of work experience. Apparently, the art of writing cannot just be acquired easily; it develops gradually with time. "Experience, they say, is the best teacher" is a common adage which confirms the result of this study. Since some people enter into the profession at the early age - between 22-25, professional work experience in relation to publishing is acquired gradually and manifest with time too. Consequently, the result of this study is realistic and justified in all its ramifications.

One plausible reason why the young librarians do not write as the old ones is that the 2-3 years after graduating from the library school may be used in mastering the basic professional duties. Secondly, subsequent years may be used in mastering the technical aspects of their jobs as well as preparing them for publishing activities in future. Thirdly, such librarians must have subject interest/speciality and build up an interest in specific research area (s) before they can start publishing. Finally, the early years of work experience could be used to amass professional or subject expertise which requires keen interest and wide reading to enable one develop research skills or expertise and cultivate the habit of writing for publishing.

CONCLUSION AND RECOMMENDATION

With the study results, it could be concluded that age was found to be a very relevant force or factor for publication output. Indeed, age had positive influence because the older librarians were more productive than the younger ones. Similarly, work experience had positive influence on publication

productivity. This means that the years of work experience help one to be more matured professionally in terms of writing for publishing. However, the younger and less experienced librarians should be encouraged to develop keen interest in research and library and information science work to enhance continuity and knowledge base in the profession.

It appears that Nigerian workers respond positively to monetary rewards as incentives to improve their productivity. As a result, the aged and experienced librarians who have published extensively should not only aim at getting to the rank of University Librarian which can only be occupied by one person at a time in a particular university.

Finally, Librarians who are old and professionally matured and experienced on the job should be targeted during personnel recruitment and deployment exercise to enhance publication productivity.

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REFERENCES

1. AFOLABI (M). The literature of librarianship in Nigeria. *Nigerian Libraries*. 1976; 12, 2 & 3; 179-191.
2. AFOLABI (M). Library and information science literature on Nigeria, India, United Kingdom and United States: a comparative study of author collaboration. *Nigerian Libraries*. 1987; 23, 1 & 2; 28-33.
3. AINA (L O): Directions of the information professions in Africa as reflected in the literature. *International Library Review*. 1991; 23, 2; 365-380.
4. AINA (L O). The periodical literature of librarianship in Nigeria: a comparative analysis of author characteristics of local and foreign based journals. *Leading Libraries and Information Centres*. 1993; 1, 2; 5.

5. BLOOMFIELD (M). The writing habits of librarians. *College and Research Libraries*. 1966; 27; 106.
6. COUGHLIN (C) and SNELSON (P). Searching output among ACRL conference papers. *Journal of Academic Librarianship*. 1983; 9, 1; 21.
7. EDEM (U S). Job satisfaction and publication output among librarians in Nigerian universities. A doctoral dissertation submitted to the University of Ibadan, Ibadan. 1993. 214.
8. HARRISON (K C). Librarians as authors. *Library Association Record*. 1982; 84; 200.
9. HARVEY (J F). Advancement in the library profession. *Wilson Library Bulletin*. 1961; 36; 146.
10. ISAAC (F). Librarians, scholars or authors? The librarians new dilemma. *Journal of Academic Librarianship*. 1983; 9, 4; 216.
11. KASER (D). A century of academic librarianship as reflected in the literature. *College and Research Libraries*. 1976; 37; 110-127.
12. LAWAL (O P). Professionalism in Nigerian librarianship; Ph.D. Dissertation, Loughborough University of Technology, Loughborough. 1983. 87-90.
13. MITCHELL (W Bede) and SWIESZKOWSKI (L S). Publication requirements and tenure approval rates: an issue for academic libraries. *College and Research Libraries*. 1985; 46, 3; 253.
14. NWAFOR (B U). Nigerian librarians and publishing. *Nigerian Libraries*. 1987; 23, 1&2; 54.
15. OLANLOKUN (S O). Characteristics of authors in three library journals. *Nigerian Libraries*. 1983; 19, 1-3; 49-54.
16. OLSGAARD (J N) and OLSGAARD (Jean K). Authorship in five library periodicals. *College and Research Libraries*. 1980; 41, 1; 52.
17. OYEGADE (E A). Structural analysis of the literature of bibliometrics as indexed and reported by Library Literature and Information Science Abstracts, 1970-1980. *Nigerian Library and Information Science Review*. 1985; 3, 1 & 2; 75-80.
18. RAYMAN (R) and GOUDY (F W). Research and publication requirements and tenure approval rates: an issue for academic libraries. *College and Research Libraries*. 1980; 46, 3; 253.
19. WATSON (P de S). Publishing activity among academic librarians. *College and Research Libraries*. 1977; 38; 375.

THE INFLUENCE OF AGE AND WORK EXPERIENCE ON PUBLICATION OUTPUT

APPENDIX

ALL THE NIGERIAN UNIVERSITIES AND THE ONES SAMPLED FOR THE STUDY

GROUP A: FEDERAL UNIVERSITIES (CONVENTIONAL)

1. *Ahmadu Bello University, Zaria
2. University of Abuja, Abuja
3. *Bayero University, Kano
4. *University of Benin, Benin City
5. *University of Calabar, Calabar
6. *University of Ibadan, Ibadan
7. University of Ilorin, Ilorin
8. *University of Jos, Jos
9. *University of Lagos, Lagos
10. University of Maiduguri, Maiduguri
11. *Obafemi Awolowo University, Ile-Ife, Ife
12. *University of Port Harcourt, Port Harcourt
13. Usman Dan Fodio University, Sokoto
14. *University of Nigeria, Nsukka
- *5. University of Uyo, Uyo.

GROUP B: FEDERAL UNIVERSITIES OF AGRICULTURE

16. *University of Agriculture, Abeokuta
17. University of Agriculture, Makurdi
18. *University of Agriculture, Umudike

GROUP C: FEDERAL UNIVERSITIES OF TECHNOLOGY

19. *Abubakar Tafawa Balewa University, Bauchi
20. Federal University of Technology, Akure
21. *Federal University of Technology, Owerri
22. *Federal University of Technology, Minna
23. Federal University of Technology, Yola

GROUP D: STATE UNIVERSITIES

24. *Edo State University, Ekpoma
25. *Abia State University, Okigwe
26. *Lagos State University, Ojo - Lagos
27. Nnamdi Azikiwe University, Awka
28. *Ogun State University, Ago Iwoye
29. *Ondo State University, Ado Ekiti
30. Delta State University, Abraka
31. Kano State University, Kano
32. Benue State University, Makurdi

GROUP E: STATE UNIVERSITIES OF TECHNOLOGY

33. Enugu State University of Technology, Enugu
34. *Ladoka Akintola University of Technology, Ogbomosho
35. Rivers State University of Science and Technology, Port Harcourt

ELECTRONIC LIBRARY - A MYTH OR A REALITY

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The emergence of new information technologies has great impact on the future of libraries in the electronic age. The present paper discusses various factors involved in transformation of traditional libraries into electronic one, the advantages of electronic library and also librarian's role therein. The Pilot Project at INSDOC for developing an electronic library is also mentioned.

INTRODUCTION

Necessity is the mother of invention. Customer's demands are the biggest driving force for the organisation of activities and changes in means of production of goods and services. The combined effect of computer and telecommunication has almost converted the world into an electronic village. It has changed the shape of things beyond recognition within a short period of a decade. The information sector has suffered the biggest mutation. People are generally discussing "will there be libraries in the electronic village?" [1]. "libraries without walls" are already talked about. The consumer demands are forcing the application of new technologies, new modes of access to knowledge stores and new techniques of knowledge search. Access to knowledge and assistance to its access are the main functions of libraries that, perhaps, will determine their survival in the electronic age.

It is being mentioned that "because the focus of knowledge work is moving to the networked desktop and to other work places, the priority focus of library service should be on the places of delivery and less on the places of supply" [1]. People visit libraries to consult the access tools for information, i.e. to seek "information about information" and to physically possess the required published document. If both these requirements are satisfied at the desktop itself, the customer will not have a

strong urge to visit the libraries. It is felt that there will be practically no visitors to the places called libraries in electronic age. The computers and telecommunications together will exactly be serving the customers in the way mentioned above at their desktop.

FACTORS OF CHANGE

A number of developments have taken place during last decades which have forced major changes in the information scenario including the library systems. The volume of information being generated around the world has brought a realization in the libraries that librarians simply cannot disseminate this huge mass of information manually. It has been estimated that one trillion pages of information was generated in USA alone in 1993 [2]. It may be safely assumed that USA produces only about 25% of world's total information output. Therefore, the total output of the world crosses 4 trillion pages in one year which is growing at the rate of 6 to 11% per year over the past decade. These mountains of paper documents have not only created the problems of their storage, miles of storage shelves every year, but also, exponentially increasing financial resources every year for the procurement of a very small fraction of total output in one's own area of activity apart from other.

SEARCHING PROBLEMS

Moreover, the users have been confronted with the problems of searching the required information may be of few pages only out of these trillions of pages. It has been estimated that on an average professionals spend only 5 to 15% of their time on reading, but upto 50% of their time looking for information [2]. With the emergence of information technology, it has been possible to store the informa-

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tion in electronic form. The required information from the electronic databases can be accessed and retrieved quickly.

LOW-COST TECHNOLOGIES

The storage and maintenance of the huge mass of paper documents year after year have become extremely costly, time consuming and labour in-

tensive. The storage and maintenance costs of paper documents is becoming more than their production cost. Moreover, the printing itself is one of the costliest option now available for distributing information. One megabyte of information on paper might cost, on average, \$ 4, on diskette perhaps \$ 1.7, and on CD-ROM might average \$ 0.0024 or even less [2] (Fig. 1). One CD-ROM can hold 1500 floppy disks or 2.5 lakh pages of

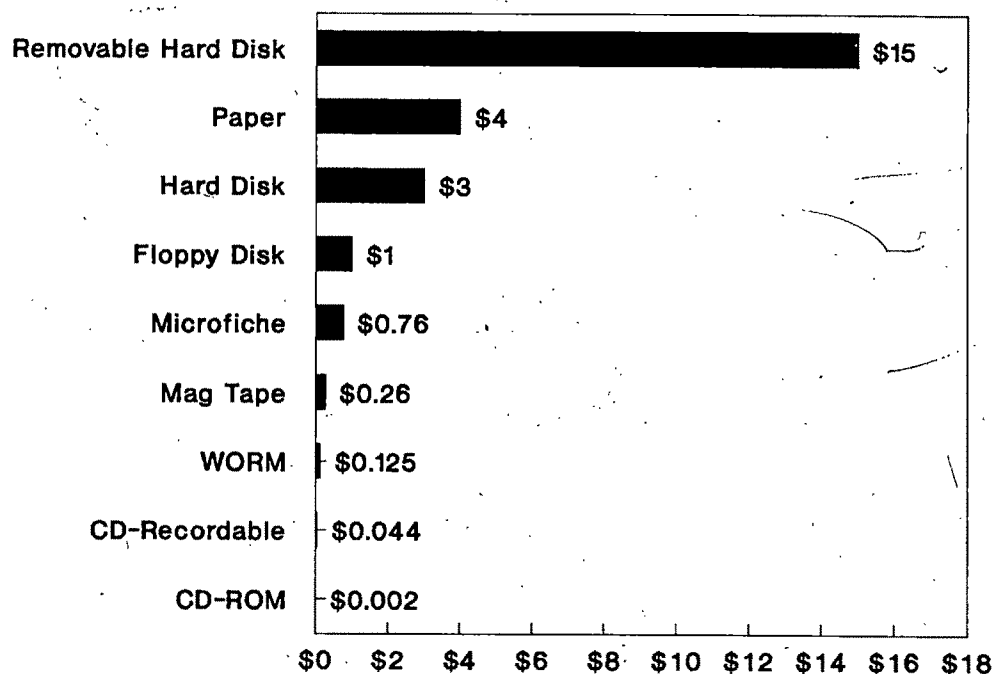


Fig. 1 : Cost per Megabyte

textual information or 12000 scanned images. The total cost of that CD-ROM might average \$ 2. The cost of equivalent information on paper might be \$ 1500 or higher. That is why more and more foreign publishers and information vending organisations have started producing bulk of their information products only on CD-ROM. Most of the abstracting and indexing periodicals are now available on CD-ROM and the libraries as well as users are very happy with their usage. Similarly, about 5000-8000 S&T full-text journals have also started appearing on CD-ROM and their subscription cost is 5 to 10 times less than their print version. This single factor is changing the shape of

existing libraries quite rapidly and it appears that by the end of the present century, CD-ROMs will replace a majority of paper documents from the shelves of some of the libraries in the country. The growth of CD-ROM Titles in the last few years is shown in Fig. 2.

ENVIRONMENTAL FACTOR

The environmentalists of the world have already started a major campaign in favour of digital publishing on CD-ROM etc. The slogan "burn a CD-ROM, save a tree" is catching the imagination of the people fast, as the electronic publishing has

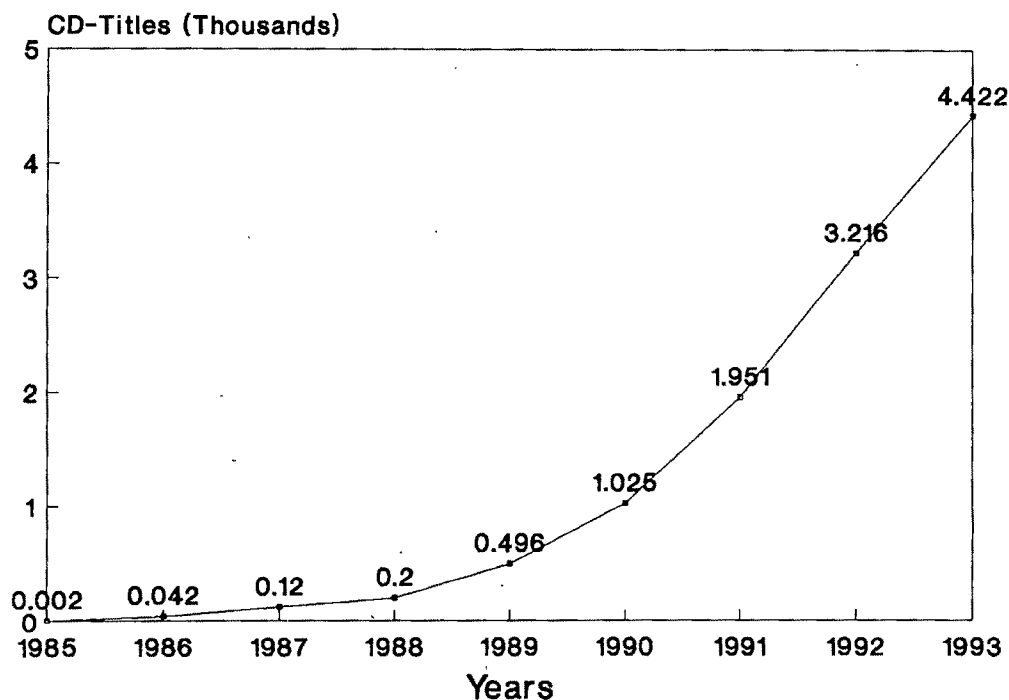


Fig. 2 : Growth of commercially available CD Titles

been found as one of the cleanest technology for reducing paper usage which has played havoc with the world's forests and environment as a whole. It is now argued that we have no choice but to reduce our consumption of paper and distribute more and more information on electronic media. According to one estimate, already 10-15% of the information generated in developed countries have started appearing only on electronic media [2]. Therefore, the libraries, in near future, will have no choice but to subscribe only to digitized documents. The Xerox Corporation, in its annual report of 1992, cited projections that the digital publishing market segment would grow at a rate of 30% per year. In the field of educational material and class-room teaching, the multi-media publishing is spreading very fast and cassettes may replace educational books sooner than we envisage. A casual view of Table 1 reveals that CD-ROM are not only enveloping the area of S&T, education but also encompassing all areas of knowledge although science and technology continue to be the most common subject area (almost a third of all titles if medicine is lumped in as well) .

INHIBITING FACTORS

Inspite of very strong driving forces in favour of electronic publishing, the electronic media has not been able to significantly replace the print media from library shelves. There are some reasons for the slow progress, though the tide is slowly rising never to reverse. Some of the inhibiting factors against electronic media may be enumerated as

- i) centuries old reading habits of paper documents;
- ii) convenience in reading and handling a paper document as compared to a floppy or a CD-ROM;
- iii) firmly entrenched print technology and a huge investment in it;
- vi) incompatible standards of electronic media products;
- v) difficult handling of hardware and software for reading electronic media products;
- vi) non-standard authoring processes and consequential reading difficulties;
- vii) different display standards and associated problems; and

ELECTRONIC LIBRARY - A MYTH OR A REALITY

Table 1

Subject distribution of commercial CD-ROM Titles

Subject Heading	Number	Percentage
Science/ Technology	1070	24
General	931	21
Social Science	776	18
Business/Law	750	17
Arts/Humanities	593	13
Medicine	298	7

Source : *CD-ROM Professional* [3].

- viii) cost and inconvenience of equipment for reading electronic media products, while no cost is involved in reading a paper document.

A careful analysis of the market forces promoting and opposing the publishing of electronic information gives a clear verdict in favour of electronic publishing as an industry and business practice, which has been reaffirmed by the real growth of this sector. Atleast the CD-ROM has already become a favorite delivery media for information and multi-media is emerging fast from other side for completing the circle.

ELECTRONIC LIBRARY

The emerging trends in the application of electronic media for wide-spread distribution of information is forcing the libraries to undergo a substantive structural modifications. The constraints of space, shelves, dusting & cleaning etc. shall be fully solved by the suggested restructuring. Prof. Tom Stonier describes what an electronic library might be like and how it might work [4]. "The library will hold materials in digitized form and its users will communicate with it over a telephone link or a coaxial or a fibre-optic cable. Its purpose is to supply its users with copies of textual, audio or video materials on request. Because supply is effected by sending a digitized signal down the communi-

cation link, and the original does not leave the possession of the library, supply is not strictly a loan any more than the issue of a photo copy of a requested article".

The electronic library, therefore, envisages, first of all, that its predominant collection, if not entire, will be in the digitized form. It is not at all difficult a problem as a large number of popular titles are already being distributed on digitized media and the libraries are happily subscribing to them as these are several times cheaper than their hard copy. Therefore, the new arrivals have already started promoting the emergence of electronic libraries. However, the problem remains for the existing material in the library. A number of libraries have started digitizing their old stock on large Write Once and Read Many (WORM) discs having a capacity of several gigabytes (GB). A disc of 6 GB can store upto 1.5 lakh pages of scanned images. Some libraries are digitizing this material on CD-ROMs having a capacity of 650 MB which can store upto 12000 pages of scanned images. All the material in the libraries can not be digitized immediately, the priority may be given to the old stock material most frequently used. Therefore, the material not so frequently used will remain in the libraries in hard copy form and the existing conventional form of libraries will co-exist with electronic library for some time.

SWITCHING SYSTEMS

The recent advances in computers and telecommunications have provided facilities to the extent that the users need not travel distances to visit libraries and they can have all what they want from a library at their working desk through their computer and telephone line. The electronic library makes available its entire catalogue and all information access tools in the form of database searchable on-line from the desk-top PC. Once the required document is identified, the user may search for the document in a given CD-ROM through a CD-Net, which can be loaded in CD-Drive by an electronic mechanism of a juke-box. The juke-box may contain several hundreds of CD-ROMs and any one of them can be commanded for loading in a drive. The digitized full text data from the CD-ROM (including graphs, figures, formulas, pictures and tables) start flowing through the wire to the screen. The whole documentation can be read on the screen, can be stored on the disc/floppy or a hard copy can be printed through a printer for reading at leisure (Fig. 3).

The switching mechanism provides a facility to access the document in some other library through a Gateway service provided to its users by one's own library. The Gateway provides a single, convenient and user-friendly entry point to a selected library of bibliographic, full-text and numeric information. The system leads to a wide range of databases hosted on various computers located at different places. The users are required to know only how to find and log in to the system. Once at the Gateway, the user gets a menu of choices with

explanation and help prompts. Once the user chooses his databases from the available databases, the Gateway software handles the log-in process behind the scenes.

In this way, the resources of a large number of libraries of one city, region or state become available at one's desk-top. John Martyn writes that if local libraries continue to exist - effectively as switching units—then physical locations of material are not of importance. All that matters is that the local nodes are able to locate requested material, and arrange for its transfer to the users via themselves. It would probably be reasonable to think in terms of regional stores, with a central 'last resort' back-up store [4]. In this way it could be possible to serve the whole national demand by creating a secured archive or back-up at one place in the nation. It may develop a new scenario in which a number of libraries may form their own consortium of electronic libraries to provide public services through a networked Gateway in the same way as the database vendors are joining database hosts for providing database services. In the new set up, owning a document will not matter much, the users will pay for usage only.

COLLECTION DEVELOPMENT

The strong market forces and economic considerations are exerting a heavy pressure on print industry to undergo a significant change. However, it does not mean that paper media will cease to exist in near future. The paper media will, undoubtedly, continue for quite sometime and similarly the conventional libraries will exist alongwith the elec-

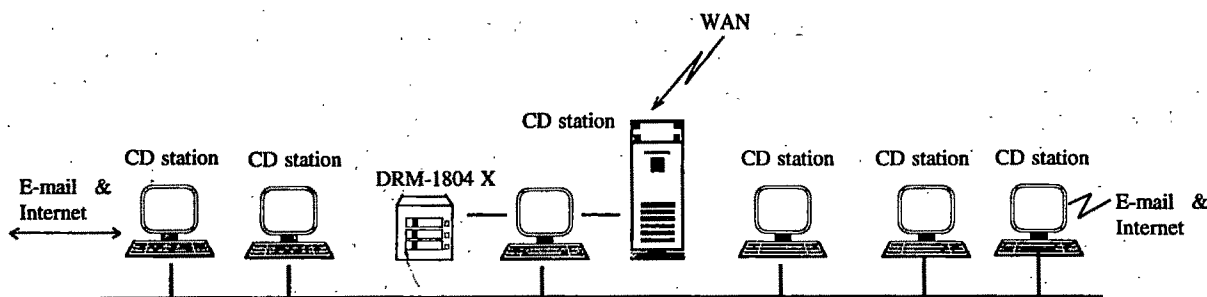


Fig. 3 : Schematic view of Electronic Library

ELECTRONIC LIBRARY - A MYTH OR A REALITY

tronic libraries for some good time even in the next century. Nevertheless, a definite and discernible trend is emerging in the world information scenario that more and more information products are appearing every year on electronic media and the specialised libraries are replacing their print media stocks and even the microfilm and microfiche media from their shelves by digitized discs. A number of specialised libraries in Western countries are converting several millions of pages per year from their old stock into digitized discs. National Technical Information Service (NTIS) of USA, for example, has digitized more than 75 million pages per year from their existing reserves of technical reports. It provides the following advantages:

- i) The reproduction of hard copy from digitized disc is almost instantaneous, neat and clean;
- ii) The document can be transferred on wire to any remote place and can be stored or converted into hard copy there instantaneously;
- iii) A tremendous saving in space, shelves, maintenance etc. is achieved;
- iv) Ease of handling, managing, searching; and retrieval of required information available; and
- v) There is no question of non-availability on shelves or loss or mutilation.

A number of large information organizations in USA and Europe are making the digitized images of periodicals which are not available in electronic form. The firms like University Micrographics Inc. (UMI) (USA), National Institute of Scientific and Technical Information (INIST) (France), British Library Document Supply Centre (BLDSC) (UK) are

electronically scanning several thousands of journals for storing the materials only in electronic form, i.e. no new procurements are being made on print media. These libraries have converted themselves more or less in electronic libraries. Future uses of image technology seem unlimited. Costs are decreasing, applications are increasing and technical limitations are being challenged and overcome. As computer networking becomes more commonplace and more powerful, new image systems will make knowledge accessible and retrievable from anywhere any time.

PILOT PROJECT AT INSDOC

The R&D community of India has been experiencing a severe drought of S&T information since 1990 due to sharp drop of periodicals subscription by Indian S&T libraries. The availability of unique journal titles in the country as a whole dropped from a total of 20,000 to about 12,000 only during the course of a decade of 80s. In order to arrest the situation from turning worse, INSDOC prepared a contingency plan of procuring 8000-10,000 foreign periodicals for satisfying the information requirements of the nation. With the generous special financial assistance from the Government of India, INSDOC started procuring full text foreign periodicals on electronic media due to obvious reasons of cost effectiveness as mentioned above and giving the facilities of electronic library to its users. The number of periodicals in electronic form have been steadily increasing over the years as indicated below:

Table 2

Number of periodicals in electronic form acquired by INSDOC

Sl.no.	Subjects	Number of periodicals
1.	Bio-medical Sciences	632 (1991 onwards) 1051 (1994 onwards)
2.	U.S. Patents	1990 onwards
3.	General Periodicals	1646 (1987 onwards)
4.	Business Periodicals	870 (1987 onwards)
5.	Physical & Engineering Sciences	741 (1990 onwards)
6.	Standards	457 (1990 onwards)
7.	Conference Proceedings	336 (1990 onwards)

All these journals are procured on CD-ROM media. The necessary equipment and softwares have also been procured for accessing the full text data on CD-ROM and providing services to the users. The subscription entailed a high royalty on printing of each article from journals. However, INSDOC negotiated with publishers a bulk payment for unlimited number of copies to be supplied to users. Though INSDOC, at present, is not providing online access facilities to the users for its full text databases, the ultimate goal is to make all the resources of INSDOC library available for online accessing by the users from their desk-top computers. A number of tasks are yet to be completed in this regard. However, the initial steps have already been taken and INSDOC has started marching on the long road of becoming the first electronic library of the country.

INSDOC is a premier national documentation centre and has an added advantage that it is one of 41 constituent laboratories under the Council of Scientific and Industrial Research (CSIR), which together hold more than two-third of India's total foreign periodicals subscription in the field of science

and technology. These laboratories are already discussing the formation of an information consortium in which the electronic library of INSDOC may play a very important role. If all these libraries succeed in digitizing their existing collection, as it is being talked about, and put these databases on a high-speed network for accessing by the users through library Gateway or through INSDOC Gateway, the electronic library movement in the country will get a major break through.

IMPACT OF ELECTRONIC LIBRARY ON SERVICES AND ROLE OF LIBRARIANS

The present libraries are selecting, acquiring and organizing the print collections and are providing instructions and assistance in finding information within the collections. Electronic libraries are being built along similar self-service lines. They are designed for use with librarians serving not as intermediaries but as consultants [6]. The librarian will continue to play the role of information provider to users in the electronic library system [Fig. 4]. However, more and more services are being built in electronic library for self-accessing modes.

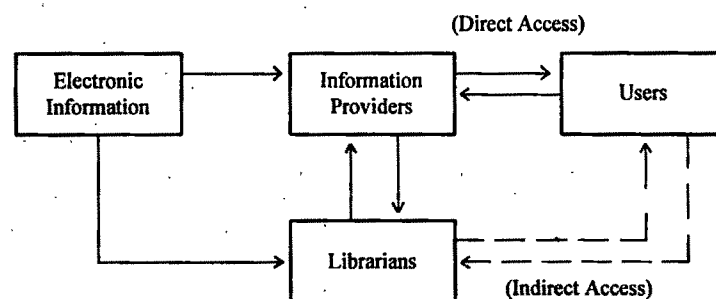


Fig. 4 : Role of librarians in the Electronic Library

A number of present library routines like acquisition, circulation and services like current awareness, reference services etc. will undergo a considerable change in the new outfit as most of these services will be automatically generated from the databases in the electronic library and the users will have direct access to them without librarian's intervention. The existing library mediated online

searching of databases will also be no more relevant in the new environment of electronic library system as the users will be doing their job themselves from their desk-top PCs. The role of librarian of the future would be as heavily involved in the repackaging of the information and even in a form of electronic publishing and some librarian will become hypertext engineers. The electronic

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document delivery would be introduced. Reference librarians may then advise the users the strategy to identify relevant electronic sources. The role of the reference librarian is evolving and shifting from one where online service mediation is required in the form of one-on-one tutorials or search sessions, to that of program manager, consultant, advocate.

FUTURE PROSPECTS

The new developments with respect to information technology will change the information cycle dramatically. Users will be able to access information, bibliographic databases and even primary sources wherever they are located, without country barriers, and without visiting a library. The full electronic library without staff and real books will do a poor job in the next decade and will not be able to meet all user needs in a research environment.

REFERENCES

1. MAC DONALD (Allan). The survival of libraries in the electronic age. January, 1994; Feliciter.
2. MARTIN (Katherine). Understanding the forces for and against electronic information. *CD-ROM Professional*. 1994, July/August; 7, 4; 129-134.
3. NICHOLLS (Paul) *et al.* The State of the Union : CD-ROM titles in print 1993. *CD-ROM Professional*. 1994, May/June; 7, 3; 125-31.
4. MARTYAN (John) *et al.* Information UK 2000. 1990; Bowker-Saur.
5. BRAID (J Andrew). Electronic document delivery: a reality at last? *Aslib Proceedings*. 1993, June; 45, 6; 161-66.
6. BARNES (Susan J). The electronic library and public services. *Library Hi Tech*. 1994; 12, 3; 44-62.
7. PACK (Thomas). UMI-history in the making. *Library Hi Tech*. 1994; 12, 3; 91-100.

SHORT COMMUNICATION

**SURVEY OF LIBRARY PERSONNEL AND OPERATIONS IN SELECTED LIBRARIES :
A CASE STUDY FROM RIVERS STATE OF NIGERIA**

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The involvements of professional librarians in material procurement, discharge of library duties and the level of involvement of non librarians in the running of the special libraries in the Rivers State of Nigeria as revealed through a survey are discussed.

INTRODUCTION

The grades of library personnel in an establishment vary according to the purpose of the library, the number of prospective users and the size of it's collection.

Libraries of different grades have been established to serve the immediate needs of users. A number of difficulties are experienced by these libraries due to various factors. Bailey [1] stated that there were several factors which may be used to determine the level of management that a person occupies in an organisation. These factors include the number of employees, the size of the budget or the functional responsibility of the department head. In some cases, the head of the library may not belong to the management level staff. While some libraries enjoy as much support as possible from the management, others are seen as mere book stores. The staff of the later category are usually under-rated and their performances fall below expectation. Even they do not have the opportunity to discharge their duties in purely professional manner due to the influence of the top management. The success or failure of these libraries depend on the co-operation they receive from the management. When such a change over takes place from a house to library, it is the duty of the librarian to creat an image awareness campaign that will put the library on a sound footing. This effort of the librarian will direct the management's

attention towards the new needs of the library. Speaking on professional image, Holladay [2] confirmed that professional respect could not be inherited from past library staff. Librarians who struggled to leave legacies past succeed in establishing good functional libraries.

This study on library personnel and operations in public library as well as libraries in ministries and industries in Rivers State of Nigeria was conducted to investigate the level of professional duties performed and the influence of sex on the library profession.

METHODOLOGY

Questionnaire method was used to collect information on the age of the libraries, staff qualification and disposition, and the influence of top management and users on the functions of the library in which folowing nine libraries were investigated.

- | | | |
|-------------------------|---|---|
| One public library | - | Rivers State Library,
Port Harcourt. |
| One theological library | - | Calvary College of
Theology, Rukpokwu. |
| Two law libraries | - | (1) Central Law Library,
High Court,
Port Harcourt.

(2) Ministry of Justice
Library, Port Harcourt. |
| Two research libraries | - | (1) African regional
Aquaculture Library,
Aluu. |

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- | | | |
|--|--|--|
| | (2) Rivers State Institute of Agricultural Research and Training Library, Onne (R.I.A.T.). | (3) National Petroleum Refining Company Library, Eleme (N.P.R.C.). |
|--|--|--|
- Three oil industry - Libraries
- | | | |
|--|--|--|
| (1) Nigerian Agip Oil Company Library. | | |
| (2) Nigerian National Petroleum Corporation Library, Port Harcourt (M.N.P.C.). | | |

RESULT AND OBSERVATION

It was observed that the Central Law Library has the largest volume of books and journals but ranked second in age (Table 1). The African Regional Aquaculture Library has the least collection just 5 years old. The Spearman's co-efficient to find the direct correlation between the volumes of books and journals and the age of the libraries has a cor-

Table 1

Number of volumes and ages of the libraries 1991-92.

Names of libraries	No. of volumes	Rank of no. of volumes	Age	Rank of age
African Regional Aquaculture Library	662	1	5	9
N.A.O.C. Library	650	2	6	8
R.I.A.R.T. Library	2034	3	9	5
N.N.P.C. Library	5000	4	10	4
Calvary College of Theology Library	6098	5	7	7
N.P.R.C. Library	7000	6	9	5
Ministry of Justice Library	20,000	7	21	1
Rivers State Library Board	70,000	8	20	2
Central Law Library	91,000	9	20	2

relation of 0.9. This shows that there is good correlation between the number of volumes held and the age of the libraries. It also portrays a steady growth in stock development. Harrison [3] pointed out that total stock might depend on little more than the poverty of book fund over many years. No matter how small book fund may be, additions of new materials to the stock is made yearly.

Except the Rivers State Library, other libraries were not having purpose built buildings. Some were offices which have been so converted. The result of this investigation shows that five of the libraries have plans for expansion within the present set up but have no plans for a separate library building.

The methods of recruiting staff showed that only the Rivers State Library engaged its staff by open advertisement. The rest employed other methods such as, recommendation by other librarians, transfer from other departments or the establishment as well as interview from existing libraries. Most of the libraries have only one or two librarians with professional qualification. One library has degree holder in a subject serving as the librarian. Para-professional librarians are just one in some of the libraries. Staff with school certificate as well as first school leaving certificate outnumber other grades of staff in every library. This cadre serve as typist, security staff, cleaners and messengers. While five libraries did not have problem in coordinating the work of the staff as a result of their different educational background, one had problem and three were neutral. A good number of the non-qualified staff engage themselves in part-time studies to qualify as professional librarians. In two of the libraries, the head librarian is not involved in setting the goal of the establishment but merely take directive from the head of the establishment.

While Celli [4] commented on the exclusion of women in the work-force in Saudi Arabia, Harris et al [5] reported that women outnumber men in librarianship by a ratio of approximately four to one in Canada. In these libraries surveyed however, men outnumber women by a ratio of six to one. On evaluation of female staff, it was noted that every librarian (male or female) preferred to work with male staff. In one library it was reported that the female staff dodged shift duties and transfer to other branches of the library.

In the Central Law Library, the librarian and the commissioner for justice acquire books for the library. At the African Regional Aquaculture, the Food and Agriculture Organisation of the United Nations (FAO) does the acquisition. In other libraries, the head of establishment or bookshop manager buys the materials with the help of the head library staff or librarian. The circulation routine and the audiovisual materials are mostly handled by the para-professional staff and the library assistants.

As regards service, users and the library staff disagree about extent of assistance of the respective library staff to users [6]. Librarians were asked to rate the services they offer to users on a scale of 1 to 6. 1 being the most important and 6 the least important. The result (Table 2) shows that book provision is ranked the most important while service to users come second in importance. Shelf reading and catalogue maintenance is ranked the least.

On resources processing, the respondents were asked to state the type of cataloguing scheme usage. While Regional Aquaculture Library uses the Universal Decimal Classification Scheme, the two law libraries use the Elizabeth Moy's Classification Scheme which is ideal for law libraries and legal literature. The Rivers State uses the Dewey Decimal Classification while R.I.A.T. library which is a branch of a University library uses the Library of Congress Scheme. N.N.P.C. and the N.A.O.C.

Professional libraries handle cataloguing of books in the libraries. In those libraries without professionals, the in-house type of arrangement is common.

Most of the libraries have no written lending policy. Where there is such a written policy, all staff are aware of its existence. Only the state library lends books to the public who have registered with them. Four of the libraries have special concessions extended to unregistered library users. All libraries frown at staff or registered users borrowing books on behalf of unregistered users.

There is no clear inter-library co-operation existing between these libraries. Some exchange materials informally and have neither maintained holdings of core collection nor union list of holdings. It is proposed that these libraries should share their resources and at least maintain a common list of holdings especially the ones similar in nature like the law libraries. Puja [7] remarked the need for initiation of this essential service. Moreover, information sharing brings in the wake the need for standardisations with all its added advantages.

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Table 2

Ranking of library functions. (Each row represents the number per rank)

Rank	1	2	3	4	5	6
Book provision	5	2	2	0	0	0
Service to users	3	2	3	1	0	0
Processing of acquired books	0	3	3	2	1	0
Compilation of reading list and literature searches	0	1	0	2	2	4
Readers advisory services	0	1	2	1	3	2
Shelf reading and catalogue maintenance	0	0	0	2	3	4

Judging from the economic state of the establishments surveyed, all the librarians think that the library does not receive an equitable share of the fund when compared with other departments in the same establishments. Miller [9] advised librarians that economic constraints would continue to press libraries to economise, standardise procedures, reduce staffing and make more efficient use of existing facilities, fund and personnel. Most of these small libraries are starved out due to lack of fund especially, as in one case, where the head librarian does not even have control over the library funds.

Finally, some users have been helpful to the library by talking good of the library at management meetings to attract funds to the library. They even donate books and other materials to library and seek support for the library to secure its requirements. The library's contribution towards the progress of the establishment centres as custodian of the publications released by the establishment. Christianson and Ahrensford [10] forecasted decline in special library activities because the establishment's lack of realistic understanding of how such a library should function or the resources that must be committed to it. The role played by individual libraries differed from one establishment to the other.

From the above results, it is clear that some of these libraries have accumulated materials over the ages. Professional librarians are few in the libraries and the library schools should be encouraged to train more librarians especially the para-professionals. Processing of materials and service to users need to be given priority when discussing service to users.

Lastly, attention has been drawn to co-operation between libraries in collection development as no library can have enough stock for its user. In fact, the result of this investigation will save the way of thinking of this type of co-operation.

REFERENCES

1. BAILEY (Martha J). Function of selected company libraries/information services. *Special Libraries*. 1981; 72, 1; 18-30.
2. HOLLADAY (Janice). Small libraries keeping the professional position. *Special Libraries*. 1981; 72, 1; 63-66.
3. HARRISON (D J). The staffing of public libraries an appraisal of the 1976 LAMAC report. *Journal of Librarianship*. 1979; 11, 3; 183-196.

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4. CELLI (John P). Special libraries of the Kingdom of Saudi Arabia. *Special Libraries*. 1980; 71, 8; 358-368.
5. HARRIS (Roma M), MONK (Susan) and AUSTIN (Jull T). Sex differences in prestige and salary found. *Canadian Library Journal*. 1986. 43, 3; 60-65.
6. KERNAGHAN (John A), KERNAGHAN (Salvinya), O'KEEFE (Robert D) and RUBENSTEN (Albert H). The influence of traditional services on library use. *College and Research Libraries*. 1979; 40, 3; 214-225.
7. PUJA (Grace K). Service to an educational research network in Tanazania. *Library Review*. 1991; 40, 5; 59-65.
8. VISHWANATHAN (T). Emerging standards for library networks. *Ann Lib Sci Doc*. 1991; 38, 3; 79-84.
9. MILLER (Beth). Information : people still count. *Canadian Library Journal*. 1986; 43, 3; 133-134.
10. CHRISTIANS (On Elin) and AHRENSOFOLD (Janet). Towards a better understanding of new special libraries. *Special libraries*. 1989; 71, 3; 146-153.
11. DUCKETT (Bob). Reference work, staff selection and general knowledge. *Library Review*. 1989; 38, 5; 14-21.

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The (*) marked journals in the list are available in electronic media in National Science Library (INSDOC) collection.

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